



Second  
International Conference  
on History, Theory and  
Methodology of Learning

*90* HTML 2021

12-14 May, 2021  
Kryvyi Rih, Ukraine

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Title, date and place of the conference

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Second International Conference on History, Theory and Methodology of Learning  
(ICHTML 2021)

May 12-14, 2021 | Kryvyi Rih, Ukraine

Proceedings editor(s):

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April 26, 2021

## ICHTML 2021 – A journal of the pandemic year

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**Abstract.** This is an introductory text to a collection of papers from the ICHTML 2021: Second International Conference on History, Theory and Methodology of Learning, which held in Kryvyi Rih State Pedagogical University, Kryvyi Rih, Ukraine, on the May 12-14, 2021. It consists of short introduction, conference review and some observations about the event and its future.

### 1 ICHTML 2021: At a glance

The **International Conference on History, Theory and Methodology of Learning** (ICHTML, <https://ichtml.org>) is a regular peer-reviewed international conference [1], which covers interdisciplinary research on education, learning and training, and applications of theories and philosophies used in the sciences of learning and adjacent sciences.

The ICHTML occupies contributions in all aspects of epistemology, psychology of learning, learning theories, learning technologies and tools, paradigms and models and related fields of interest with a emphasis on human and machine learning. The main problematic field of the conference is the current and future issues of modern pedagogical science: psychological and pedagogical, philosophical, socio-cultural aspects of education, learning and training, modern theories, technologies and teaching aids, the emergence of which is determined by globalization, integration processes, social transformations, humanitarian and scientific and technological development. There is urgent general need for principled changes in postclassical education elicited by current theories, models, tools, services, networks and communications.

This volume contains the papers presented at ICHTML 2021: Second International Conference on History, Theory and Methodology of Learning held on the May 12-14, 2021 in Kryvyi Rih, Ukraine.

There were 61 submissions. Each submission was reviewed by at least 3, and on the average 3.2, program committee members. The committee decided to accept 38 papers.

ICHTML 2021 papers are grouped into 3 tracks:

Track 1: History of Learning and Education

- Evolution of Education, Learning and Training (papers [2], [3], [4], [5])
- Personalalia (paper [6])

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- World Trends in Learning, Training and Education Development (papers [7], [8])

Track 2: Learning Theories

- Analytical Psychology and Learning (papers [9], [10])
- Assessment in Learning (paper [11])
- Development and Learning (papers [12], [13], [14], [15], [16], [17], [18], [19])
- Discourse and the Production of Knowledge (papers [13], [20], [21])
- Philosophy of Learning (papers [22], [23])
- Psychology of Learning (papers [9], [24], [25])

Track 3: Learning Methodology

- Learning Technology (papers [3], [26], [27], [28], [29], [30], [31], [32], [22], [33], [34], [35], [36], [37])
- Sociology of Education (papers [38], [39])

### 2 ICHTML 2021: Venue

Kryvyi Rih State Pedagogical University (<https://kdpu.edu.ua/en>) is one of the leading institutions of higher education in the education system of Ukraine. The University has more than 90-year experience in training generations of specialists for the state and public needs (figure 1).

Today the University is a center of education and science in Kryvyi Rih, as well as a center of culture because, in addition to Pedagogical specialties at all three educational levels, Kryvyi Rih State University trains specialists in tourism, ecology, it also prepares philologists, translators, historians and jurists, designers and choreographers for educational institutions of the city and region.

Kryvyi Rih State Pedagogical University has a long history, ancient traditions and it cherishes them up to this day. It was founded in 1930 as an institute of vocational education, but over time the number of specialties, which



**Figure 1.** Kryvyi Rih State Pedagogical University logo

applicants studied at, as well as the status of the institution increased: Kryvyi Rih State Pedagogical Institute, and since 2001 – Kryvyi Rih State Pedagogical University. In 2011–2015 KSPU functioned as a structural unit of the Kryvyi Rih National University, and since 2016 as Kryvyi Rih State Pedagogical University. Currently, the university trains specialists in 30 specialties of the first (bachelor's) level, in 19 specialties of the second (master's) level and in 14 specialties of the third (educational and scientific) level.

The university has 8 faculties: Ukrainian Philology, Foreign Languages, Geography, Tourism and History, Preschool and Technological Education, Physics and Mathematics, Science, Psychology and Pedagogy and the Faculty of Arts, which includes Music and Pedagogy, Art and Graphic departments. The university conducts research in four areas: Mathematical and Natural Sciences (Primarily Physics and Ecology), Social Sciences (Pedagogy, Sociology, Psychology), Humanities (Philology, Philosophy, History) and Biology. The educational process is provided by 29 doctors of sciences, professors, 219 candidates of sciences, associate professors.

The university has international contacts with more than 30 higher education institutions and research institutions in foreign countries. Researchers and applicants participate in international projects and European academic mobility programs.

Despite the pandemic and economic difficulties in the country, the university is dynamically developing and advancing in the domestic rankings among higher education institutions. Thus, Kryvyi Rih State Pedagogical University maintained and, according to some indicators, improved its position in 2020. KSPU is on 36th place out of 190 universities according to the rank of Scopus (for comparison: 2019 – 91), in the TOP-200 on 75th (2019 – 157), and in the consolidated ranking – 101–105 (2019 – 148–151), which we shared with other universities, from 24. In 2019 KSPU entered the top ten pedagogical universities of Ukraine, and in 2020 consolidated its position and now it takes the 8th position in the consolidated ranking.

In 2018 KSPU data were added to another rating, namely: U-Multirank 2018/19. In 2020 Kryvyi Rih State Pedagogical University improved its indicators and rose from 89th place to 71 out of 176 universities.

### 3 ICHTML 2021: Program committee



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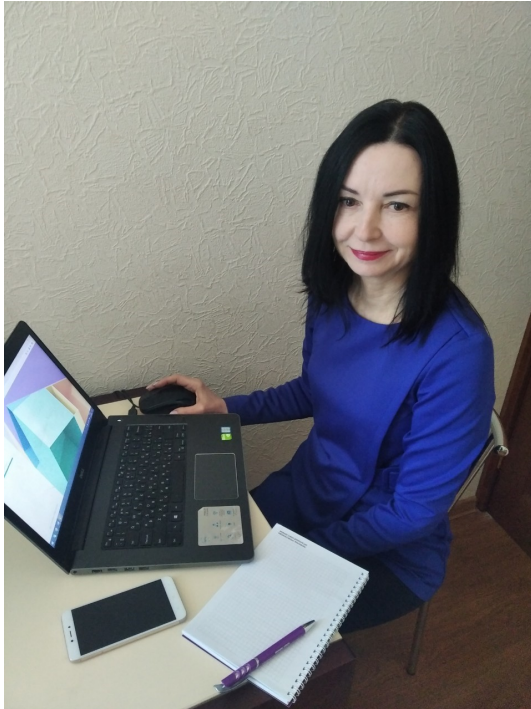
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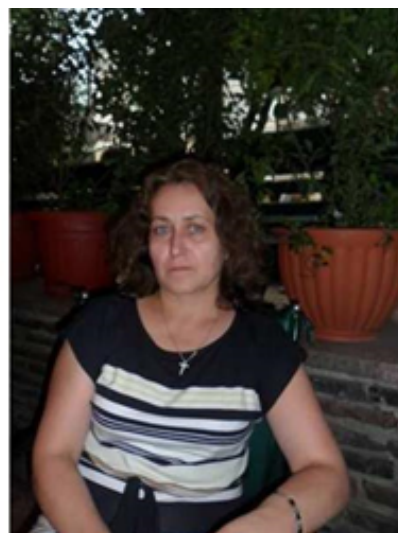
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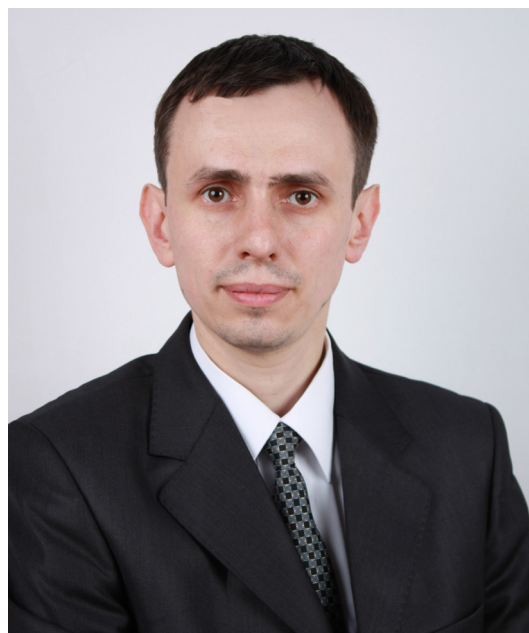
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#### 4 ICHTML 2021: Conclusion and outlook

The vision of the ICHTML 2021 is to create a leading interdisciplinary platform for researchers, practitioners and educators, to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of learning.

The conference is a successfully performing forum to transferring and discussing research result among the academics, students, teachers, government, private sector or industries. Participants and presenters from several countries such as Czechia, Finland, Netherlands, Poland, Russia, Slovakia and Ukraine have attended the conference to share their significant contribution in research related to the History, Theory and Methodology of Learning.

We are thankful to all the authors who submitted papers and the delegates for their participation and their interest in ICHTML as a platform to share their ideas and innovation. Also, we are also thankful to all the program committee members for providing continuous guidance and efforts taken by peer reviewers contributed to improve the quality of papers provided constructive critical comments, improvements and corrections to the authors are gratefully appreciated for their contribution to the success of the conference. Moreover, we would like to thank the developers and other professional staff of *Not So Easy Science Education* platform (<https://notso.easyscience.education>), who made it possible for us to use the resources of this excellent and comprehensive conference management system, from the call of papers and inviting reviewers, to handling paper submissions, communicating with the authors etc.

We are looking forward to excellent presentations and fruitful discussions, which will broaden our professional horizons. We hope all participants enjoy this conference and meet again in more friendly, hilarious, and happiness of further ICHTML 2022.

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# Social and cultural activity of Ukrainian progressive intellectuals of the late 19th – early 20th centuries

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**Abstract.** The article deals with the social and cultural activities of Volodymyr Naumenko (1852–1919), a prominent representative of the Ukrainian progressive intellectuals of the late 19th – early 20th centuries, teacher and methodologist, editor and publisher, scholar and politician, educator and active public figure. Some aspects of V. Naumenko’s creative activity aimed at reviving the national consciousness of the Ukrainian people through the construction of an educational system on a democratic, national basis, the preparation and publishing of textbooks in the native language, the training of teaching staff for public schools are highlighted. The results of the active participation of a figure in such educational societies of the specified period as “Hromada”, “Prosvita”, “Society for promotion of primary education”, “Kyiv Literacy Society” are presented. V. Naumenko’s views on the process and features of teacher training for public schools are characterized.

## 1 Introduction

At the present stage of cultural and historical development of Ukraine, it is crucial for public attention to be focused on the society as a stable social community, characterized by the unity of living conditions and community of culture. To characterize a particular social and cultural situation of personality development, several factors must be considered, namely: factors of internal development (economic model of development, social dynamics, changes occurring in the state system and political regime), historical factors (national cultural development, spirit of upbringing of generations), influence of the world social and cultural situation.

The concept of social and cultural activity has two aspects – cultural and social, and determines the content of the two concepts: “cultural activity” and “social work”. The object of social and cultural activity is socio-pedagogical and socio-cultural environment of human existence. The subject of social and cultural activity are any possible means and forms of active influence of socio-pedagogical and socio-cultural environment on the spiritual development of different social, age, professional and ethnic groups, their education and upbringing.

The most complete and representative study of the educational and upbringing phenomena of the past is possible only in the context of the development of national pedagogical thought. The study and analysis of personalities as a separate subject of historical and pedagogical research is important, since personal biography is often the basis of scientific reconstruction of the era and the coverage of the pedagogical experience of a certain period.

Therefore, the priority is to revive the names of prominent cultural and educational representatives whose heritage has been removed from the historical and pedagogical process. These are the figures of the second half of the nineteenth century-beginning of the twentieth century – the period of formation of the national system of education and upbringing, the introduction of the national component in the structure of pedagogical science, the epoch of the birth of a whole galaxy of famous and significant educators, representatives of education and art. First of all, they are the members of “Hromada” and other educational organizations whose purpose was to spread education among people, to form a national idea and national mentality, to develop and preserve Ukrainian culture. The main directions of their pedagogical and cultural studies were collecting, highlighting and revealing sources of folk pedagogy, exploring the cultural heritage of the past.

## 2 Materials and methods

The activities of the Ukrainian intelligentsia took place under the influence of liberation ideas, which were established in the Ukrainian lands in the second half of the 19th century – in the early 20th century, and were associated with the national education movement and the development of Ukrainian nation-building. Among the scholars in the field of history of Pedagogy, the socio-cultural activity of the Ukrainian intelligentsia was studied by L. Berezhivska [1], L. Vovk [2], I. Zaichenko [3], I. Likarchuk [4, 5], N. Pobirchenko [6], I. Nadiiezhkina [7].

The objective of this study is to highlight and analyze the main areas of cultural and educational activities of Volodymyr Naumenko as a representative of the Ukrainian

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progressive intelligentsia of the late 19th – early 20th century and to determine the role of the figure in the formation of Ukrainian education.

The methodological basis of the study are the main provisions of the theory of scientific knowledge: the unity of historical and logical; the importance of subjective experience as the main measure of the essence of human personality; consideration of the phenomena and facts of creative life of the teacher through historical and cultural principles; determining the role of an active person in the history of education, pedagogical science.

The research was carried out on the basis of the historical approach, using the comparative-historical method, which allowed to investigate the emergence, formation and development of processes and events in chronological sequence in order to identify internal and external connections, patterns and contradictions.

Thanks to the system-activity approach the component structure of human activity was studied: need – subject – object – processes – conditions – result, and personal activity was considered as a dynamic system of human interaction with the external environment, as well as a specific professional, scientific, educational, etc. form of human activity, in which one reaches certain heights through the use of socio-cultural approach in the process of research, the attention was focused on the strategic social goals of historical reproduction of society with its national cultural specifics and systemic characteristics of cultural-value complexes of social adequacy and cultural competence of new members of this society. Its use has provided a multi-factorial approach to the study of socio-cultural environment (space), the mechanisms of communication of “social” and “cultural” systems.

### 3 Results and discussion

Volodymyr Naumenko (1852–1919) – a teacher and methodologist, editor and publisher, scientist and politician, educator and active public figure had a worthy place among those who worked on the development of national pedagogical thought, education in native language and presented Ukrainian pedagogy as an integral part of national culture.

V. Naumenko left a significant pedagogical legacy – textbooks, manuals, programs, publications in periodicals, methodical developments, valuable manuscripts, epistolary. His works have not only pedagogical, but also universal historical value, because they reflect the actual problems of the development of Ukrainian state, cultural, political and spiritual development of the Ukrainian people in the second half of the 19th century – in the early 20th century.

Representatives of the social and educational movement saw the way to preserving the nation precisely in the development of the school, in the enlightenment of the people, in the creation of the national system of education. This case was quite complicated because everything Ukrainian was strictly forbidden in Ukrainian: language, history, literature, culture. For Ukrainian children the educational process was held in a foreign language. The task

of the social and educational movement was not only to teach the mass literacy and provide the necessary knowledge that would be sufficient for certain life needs, but also to open up the world to a person, to elevate his role in public life, to show the connection with the environment, to give it an opportunity to get acquainted with national history, to study the lives of their predecessors and to reflect on the present.

In order to revive the national consciousness of the Ukrainian people, Volodymyr Naumenko considered it necessary to build an educational system on a democratic, national basis, to conclude and publish textbooks in the native language, to train teaching staff for public schools. He understood that in order to create a nationally conscious generation of Ukrainians, it was necessary to reform the education system of that time, and he considered the main task to be the introduction of education in native language, especially in the initial period of study. V. Naumenko, as a teacher-practitioner, argued that a primary school teacher should approach the local folk dialect in his speech, using those words and expressions that are understood by the children of the area, and only gradually introduce them into the world of literary speech [8].

While giving priority to the native language of the students, V. Naumenko was convinced that in a country such as Russia, teaching should be based on the principle of nature in relation to the native language of each nationality, and even more so in elementary education. However, the scientist did not deny that the state language should take its proper place, without displacing the native language of the students.

In his article “Mother tongue as a subject of high school course” (1881) V. Naumenko considered the importance and role of the mother tongue in the secondary school course. He noted that mother tongue is, first and foremost, a means of expressing one’s thoughts, and on the other hand, of knowing one’s self. The author introduced the reader to the circle of folk philosophy, which is expressed in the form of words and in the combination of words. He emphasized that both folk literature and grammar of language are familiar with the people’s outlook, because a certain syntactic construction of language, or another etymological form, even a phonetic feature, testify both to the nature of folk thinking, and to the level of development of the nation, its identity [9].

V. Naumenko’s study “Bookish Way of Speaking of Little Ukrainians and Russinians” (1899) is also devoted to the issue of the Ukrainian language, which “... has long been a constituent of many disputes and, unfortunately, of misunderstandings” [10]. In this research the author makes some critical remarks about the individual works of Slavic scientist T. Florynskyi, who opposed the fullness of the Ukrainian language and literature. In the mentioned article Volodymyr Pavlovysh emphasizes that the development of an independent original cultural language will contribute to the development of the nation. “Perhaps, – the author writes, – in this latter case, the power of the people is genius, and the power of poetic sense and even the most ethical beginnings of humanity will receive greater intensity in their perfection” [10].

In the publication “Boosters of the Russian language in Halitsia” (1899) V. Naumenko argues that “... the complete alienation of the literary language from the vernacular is a brake on the development of the nation” [11]. However, as noted, the teacher did not deny the benefits of learning Russian literary language, as well as the benefits of knowing as many languages as possible.

V. Naumenko genuinely believed in the possibility and necessity of the existence of Ukrainian culture, education, language as well as the ability of the nation’s genius to travel the difficult path to national self-awareness and self-affirmation. “If it were not for the artificial, political inoculation of Russification by any means, then the Ukrainian people would naturally go the direct way of a self-sufficient nation”, V. Naumenko emphasized. He asserted that “... the government’s efforts to erase the national spirit of Ukrainians for many years, trying to replace them with a Russian-language principle, have led to the domination of these Russification principles in wide circles of society. As a result, it turned out that the Ukrainian national idea met with strong resistance...” [12].

According to V. Naumenko, the development of the national school as one aspect of Ukrainian education and culture in general was closely connected with the development of the nation.

Understanding the need for nationalization of education, representatives of the Ukrainian progressive intellectuals struggled for the national school, using various forms of educational activities. In 1881 V. Naumenko was the only teacher of Kyiv Secondary School among other teachers in Kyiv, who expressed a desire to arrange public readings in order to facilitate promotion of public education.

As a full member of the Kyiv Society for Promotion of Primary Education, V. Naumenko worked in the “Public Reading Commission”, in the historical and literary section. In the list of lectures planned by the Kyiv Society for Promotion of Primary Education for 1903, among others, there were also lectures by V. Naumenko: “What was Written about the Ordinary Little Russian People 100 Years Ago”, “The First Printed Works of Little Russian Literacy a Hundred Years Ago (I.P. Kotliarevskiy)”, “Kvitka-Osnovianenko’s Little Russian Short Novels” [13].

V. Naumenko’s report “Taras Shevchenko and the Motives of his Poetry” opened a literary and musical evening, organized by the Kyiv Society for Promotion of Primary Education. In introducing to the people, the work of Ukrainian writers, V. Naumenko hoped to feel “... that Ukrainian movement, which by its very fact will support the strength of the Ukrainian word in our side, and at the same time will help to bring to find out our local forces” [14]. The activity of V. Naumenko in the Kyiv Society for Promotion of Primary Education was also directed at the development of Ukrainian education [15].

In 1882 the Progressive Intellectuals of Kyiv founded the Kyiv Literacy Society (1882–1908), which launched educational work in Kyiv, Podillia and Volyn provinces. The first chairman of the organization was Kyiv governor S. Hudym-Levkovich, and V. Naumenko since March 21, 1897 [1].

The Society regulations provided for: material support for existing and opening of new public schools; creating classes for adults; rewarding teachers and providing financial aid to poor students, awarding prizes for the best work aimed at educating people; publishing of books and textbooks for public reading; distribution of books and periodicals for public reading; establishment of book-warehouses at schools; mediation in providing schools with books; formation of rural libraries.

The real purpose of the Kyiv Literacy Society according to V. Naumenko was “to serve the public education in the Southwestern Region”. One of the goals of this activity was “... the creation and support of public libraries, which were opened by the Society as far as possible in all three provinces of the Southwestern Region” [16].

The Library Commission of the Kyiv Literacy Society began considerable work in creating school libraries and providing books to the public. One of the objectives of the library commission was “... free distribution of books to rural schools, rural libraries and other institutions and individuals” [17]. Its members collected information about those villages where there was a possibility to found a library, searched for a room for it, “... then, with all the necessary documents, sent the library’s charter for approval to the Governor” [16]. Difficulties arose from providing libraries with literature due to a catastrophic lack of funds. And still, V. Naumenko made every effort to get his books to the rural libraries in time.

Such libraries were created not only in rural areas but also in cities. Thus, the library-reading room was also opened in Kyiv in 1899 with the purpose of “... providing to all residents of the city free use of books and periodicals for reading at home, as well as in the reading room” [17].

As a result of this activity, as noted by V. Naumenko in one of the official reports, Kyiv Literacy Society has formed more than a thousand different libraries, both on personal initiative and on behalf of various institutions. Public libraries were in high demand among the population. Thus, in 1897 the average daily visits to the 1st Kyiv library-reading room were 36.4, in 1898 – 38.4, in 1899 – 45.3, in 1900 – 69.3, in 1901 – 140.5 [18].

During the work of the Library Commission under the leadership of V. Naumenko many bookstores were founded, where Ukrainian books were sold. Such bookstores were opened in Kyiv, Volyn and Podillia provinces “... to promote the distribution of the finest works of fiction and popular science literature available to people both in terms of content and price” [17].

The development of the bookstore networks for people was very important for V. Naumenko. He believed that it could significantly influence the increase of the cultural and educational level of the Ukrainian people. Such activity was not acceptable for the tsarist policy, the authorities closely followed the society and its members. Officials tried in every possible way to suppress the activities of V. Naumenko and the Kyiv Literacy Society headed by him. Thus, in one of his official addresses, the Governor-General noted that the society “... recently began to provide them (libraries-reading rooms) with various kinds of brochures ... designed primarily to incite the rural popula-



tion against the existing management order” [16]. Besides, the acquisition of libraries of educational institutions was regulated by the state documents [19].

V. Naumenko had to find arguments to defend the educational activities of Kyiv Literacy Society. Responding to allegations of misappropriation of books in the school libraries, he explained that all acquisitions were made according to the rules and regulations of state documents. The existence of “doubtful” books from the perspective of book managers explains the government’s abolition of restrictions on providing libraries with books only through special catalogs. “The members of the Literacy Society sought to enrich the holdings of public libraries in the least possible way,” said V. Naumenko, “of course, they took advantage of the new rules that made it possible to more fully satisfy new libraries with all those books that most satisfied the educational aspirations of the people” [16]. He insisted that, taking into account the new laws, there should be no restrictions on the acquisition of publicly accessible books by libraries. V. Naumenko also stressed that the law does not oblige a society to submit for approval lists of books that will make up the library’s fund.

V. Naumenko was most criticized for the books on social sciences and national studies in the national libraries, as well as books written in Ukrainian.

The struggle was difficult. Libraries and book stores were closed, books were removed and bans were placed. However, thanks to the selfless work of V. Naumenko, the educational activity of the company did not stop. Only in 1901 did the members of the society manage to open and staff 5 public libraries, and preparations were made for the opening of such libraries in three more villages of Podillia and Volyn provinces. The report on the activities of Kyiv Literacy Society (1902) stated that the most important achievement should be considered the arrangement of public libraries within the Kyiv, Volyn and Podillia provinces [18].

Kyiv Literacy Society has also started a significant work within the framework of the school commission, which permanent member was V. Naumenko. The purpose of the school board activities was “... to develop, both theoretically and practically, all the issues related to the school business”. Such a goal was specified in the following tasks: opening of new public schools; establishment of classes for lessons with adults at public schools; consideration of requests from different persons and institutions for financial support and various instructions and advice on school matters; acquaintance with life and activities of provincial schools according to the provided reports; support of schools, founded by the society [17].

Thus, in 1900, Kyiv Literacy Society, headed by V. Naumenko, founded five schools: two for male, two for female and one with two classes, both male and female. In four of these schools, classes were held on Sunday, and in one, namely a prison school for women – on weekdays. In 1900, 750 pupils attended these schools: 518 male and 232 female. It should be noted that all the necessary educational supplies, such as books, exercise books, pencils, pens, were provided to students free of charge [18].

Opening of the Community Hall in Kyiv was one of the important forms of educational activity improvement, as well as an important condition for the unification of disparate educational institutions.

The expediency of its construction, which began in 1899, was defined by V. Naumenko as follows: “Taking the initiative to build such a house, the Literacy Society was guided, on the one hand, by the awareness of the immense benefit of such educational institutions to the people, and on the other by a deep conviction in the urgent need to build a Community Hall in Kyiv, where so little has been done for its many thousands of working-age adults” [18]. According to the report of the Society, signed by the Council Chair V. Naumenko, it is known that upon completion of the Community Hall construction it was planned to accommodate the following premises there: a large auditorium for 1000 people for reading and theatrical performances; two large halls of the free library-reading room; two halls for the mobile museum of textbooks; two halls for Sunday school and evening classes for adults; a tea room and a cheap canteen; premises for the Literacy Society bookstore; apartments for the head of the Community Hall, librarian and employees; two three-rooms apartments for rent. The purpose of this structure was to serve the public education.

V. Naumenko has been the Council Chair of Kyiv Literacy Society for 11 years. All this time he made considerable efforts to preserve the society and has contributed to his active work.

The year 1905 was quite difficult for the society because of its revolutionary sentiments. Even before the known events, the activities of the society were recognized by the official government as harmful to the masses, the more so it became noticeable at that time. V. Naumenko was forced to write an internal report addressed to the Governor-General of Kyiv, Podillia and Volyn, stating that recently, under the influence of complex relations between political parties and groups, the activities of some societies and institutions, including Kyiv Literacy Society, was criticized in media. In his report V. Naumenko argued that the main idea of Kyiv Literacy Society has always been the education of people without going through politics. Such apolitical direction was commented on by the main provisions of the Society Charter: “... to work in the spirit of the progressive and educational direction, without going beyond the limits of law” [16]. However, despite all the explanations and attempts of V. Naumenko to preserve this educational organization, the activity of the society in 1908 was stopped.

It is difficult to overestimate the importance of Kyiv Literacy Society in the education of Ukrainian people. The members of this educational organization were able to achieve significant results, which, in particular, were noted in one of the latest reports: “... a number of libraries were organized, books were collected and sent to them, mass of folk literature was organized, a warehouse was organized, a museum was founded, Sunday Schools are successfully functioning...” [18].

The merits of V. Naumenko as a leader of the society, an active figure in public education were highly ap-

preciated by his contemporaries. At the Society's Annual Meeting in 1900 his colleagues expressed "... their gratitude especially to the Honorable Chairman of the Society V. Naumenko ... thanks to whom the Society so successfully manages .. to come off victorious from many life troubles" [18].

During his activities at Kyiv Literacy Society, V. Naumenko did not stop his active work in Kyiv community, which at the end of the 19th century has become a powerful force in a democratic society. Among the senior representatives of Kyiv community were M. Drachmanov, V. Berenshtam, P. Zhitetskyi, P. Kosach and others. V. Naumenko among others belonged to the young generation. However, the youth was not passive and did not stand aside, the young community members were concerned with the problems of Ukrainian culture and education, and worked diligently for the benefit of the nation.

Representatives of different generations of the Community were united in joint work, in particular, the creation of the Ukrainian dictionary. For this work the community members met in their own houses. Such meetings were held also at V. Naumenko's house. For many years the community members have been collecting material for this dictionary. This was of great importance for the development of Ukrainian literary language. In the early 90's, when enough material had already been collected and processed, they decided to start printing. This case was entrusted to V. Naumenko personally. He spent a lot of time for publishing the dictionary: he personally edited the first letters, sent the corrections of the dictionary, negotiated with representatives of the typography, consulted with scientists, including O. Shakhmatov.

Much work has been done to overcome the censorship bans on typing the Ukrainian dictionary. Volodymyr Pavlovych's diplomatic abilities allowed him to obtain permission to print with the condition to call the dictionary "Russian – Little Russian". Not all users of the famous "Grinchenko's Dictionary" today are aware of the dramatic events that remain only in the memoirs of contemporaries associated with the preparation of this unique edition. In light of this, we also see Volodymyr Naumenko as an amazing man, a patriot who is capable not only of dedication but also of sacrifice.

The materials for the dictionary were already on the desktop. V. Naumenko obtained the permission for printing and prepared the first part – two letters, ending with the word "borozna (furrow)". This publication has already reached the readers of the magazine "Kievskaya Starina", when it became known that the Dictionary has a chance to win an academic prize of M. Kostomarov. It was necessary to urgently revise the edition. Being busy with a magazine, public and pedagogical activities, V. Naumenko could not devote much time to work on the Dictionary.

The Dictionary Commission, consisting of E. Chykalenko, V. Berenshtam, and E. Trygubov, offered to invite B. Grinchenko to work on the edition. It was decided to pay him 100 rubles a month. Negotiations with a well-known writer took quite a long time. The point was that B. Grinchenko wanted a monopoly right in the preparation of the publication. He insisted that he

himself edit all the letters and will be the only author of the publication. Such a situation was considered unjust by the community members – they insisted that the name of V. Naumenko, who gave so much energy to this case, should also be given on the cover of the Dictionary. "We wanted, – E. Chykalenko wrote, – to have the name of Naumenko on the dictionary, because he put a lot of work on it, and justice demanded moral payment for that worthless work for many years" [20].

When Volodymyr Pavlovych learned of the details of the negotiations with B. Grinchenko, he immediately relinquished his copyright to the Dictionary. He even prepared a new version of the contract himself. Moreover, he continued to work with B. Grinchenko, greatly assisting in the preparation of the publication.

In 1904, the anniversary of the Ukrainian writer Ivan Nechui-Levytskyi was celebrated in Kyiv. The Ukrainian intellectuals, who gathered at the event, approved a request to the government to improve the status of Ukrainian literature. The delegation consisting of Olena Pchilka-Kosach, Mykola Dmytriev, Volodymyr Naumenko and Illia Shrag was selected by the participants of the commemoration. The delegation went to St. Petersburg, with the appeal to the Prime Minister S. Witte, demanding to cancel restriction of the Ukrainian word. According to the member of the delegation, Olena Pchilka, V. Naumenko started talking about the state of Ukrainian life and Ukrainian word. The importance of the work of this delegation was emphasized by S. Siropolko: "Various Ukrainian organizations followed this initiative, wrote petitions about the needs of the Ukrainian school and Ukrainian word" [21].

In the history of Ukraine, the "Prosvita" Society, which operated on ethnic Ukrainian lands from 1868 to 1939, have successfully fulfilled the vital tasks of establishing a system of public education. The researcher L. Berezivska defines the type of these public organizations as "... scientific and educational, which aimed to promote the development of certain types of education or public education in general" [1].

The "Prosvita" Charter stated: "The Society aims to promote the development of Ukrainian culture and, above all, to enlighten the Ukrainian people in their native language, acting within the limits of the city of Kyiv and Kyiv province" [22]. B. Grinchenko, S. Tymoshenko, Lesia Ukrainka, V. Vinnychenko, D. Doroshenko, S. Yefremov, V. Durdukivskyi, L. Yanovska, S. Rusova, I. Ogienko and others worked in this organization. Volodymyr Naumenko was a full member of the society.

However, the activities of the society were characterized negatively by the official authorities, since, in their opinion, the said society, along with other activities, was also engaged in the production of publications, "... the purpose of which is to discredit monarchical power and to propagate republican ideas" [23]. Appreciating the "Prosvita" activities as a threat to public order, on April 8, 1910, the representatives of the tsarist authorities in Kyiv found it necessary to close this society. These events also affected V. Naumenko's career. In 1911, a secret adviser, R. Zilov, did not support V. Naumenko's request for his further work as a teacher [24].

1917 was a year of great change. With the victory of the February Revolution, which liquidated the autocracy, greater opportunities for the Ukrainian national education movement opened up, and a new period in the activities of educational societies began. The main organizational form of the movement for national revival of education became the Prosvita Societies, which in spring of 1917 resumed its activities. Kyiv Prosvita was one of the first in Ukraine to resume its activity. V. Naumenko was elected the Community Chair. He also chaired the general meeting on May 14, 1917, at which the plan of work of the commissions was approved.

In the first year of existence of the Ukrainian People's Republic, the educational movement unfolded quite widely. Both in the cities and in the villages there were mentioned public organizations, which were subordinated to Kyiv Prosvita Society. The purpose of these associations was to educate their members "... in the light of good science and through the knowledge to lead them to a better public national life" [1].

In order to obtain details of all existing Prosvita Societies in Ukraine and their integration, the Extracurricular Education Department has set up an organizing committee to organize the Prosvita Congress. According to the director of the Department S. Rusova, such an idea was caused by the fact that "... there was a feeling of dissatisfaction with the Prosvita's work: there was no certain leading opinion in their activity; a central body that could provide the desired direction to the Prosvita competitions could widely provide material and moral assistance to these truly national organizations" [25].

The All-Ukrainian Prosvita Congress began its work on September 20, 1917. The opening speech was made by I. Steshenko, Secretary General of Education. V. Naumenko reported on the difficult situation of Ukrainian national education.

At this time, the issue of nationalization of education and the creation of a Ukrainian school are being actualized in the political and educational arenas. In his article "School Nationalization in Ukraine" V. Naumenko mentioned the following priorities as the most important:

- recognition of the right for the Ukrainian language to be an honorable place in schools, it should not be harassed, contemptuous or even unwanted;
- recognition the Ukrainian language as the language of teaching at primary school, and at secondary, higher and special-teaching schools as the language to be studied, with the latter being compulsory, and for the first two – optional [26].

From the first days of creation of the Ukrainian People's Republic, extensive work has begun in the direction of Ukrainization of education. V. Naumenko himself reduced the problem of Ukrainization of education to two aspects: introduction of teaching in the Ukrainian language and introduction into the curriculum only some Ukrainian subjects at secondary school. The teacher emphasized that issue of teaching in Ukrainian requires consideration of the following factors: national composition of students;

appropriate staff composition; selection of textbooks and manuals.

V. Naumenko attributed a course of native land history, native literature, geography and ethnography, as well as acquiring scientific knowledge of the Ukrainian language, to the subjects to be introduced at high school [27]. The teacher emphasized that the necessity of introducing along with the subject of the native land geography also the course of ethnography is explained by pedagogical tasks.

Filling the content of education with Ukrainian subjects required changes to the curriculum in order not to load students with an excessive amount of information. To solve this problem, V. Naumenko offered to remove from the programs of history, literature and geography all that was taught only to satisfy the requirements of the tsarist regime. According to the teacher, the program hours were released and could be filled with Ukrainian subjects.

According to V. Naumenko, reforming the content of education involved changing the requirements for the teacher, his knowledge and working methods. "If we are to start a school reorganization, – he noted, – it is not so much a question of how a school can be reorganized, but a matter of how well the teaching staff is prepared" [27]. Teacher training was an urgent need. The teacher considered that the success of the initiative depends on it. "Otherwise, – he said, – it cannot be". In order to be sufficiently prepared for pedagogical activity in the national Ukrainian school, it is necessary for the teaching staff to be at the highest level of knowledge of their mother tongue, not only practically but also theoretically, and also to be familiar with the main scientific subjects closely related to the national type, like: literature, history, geography, ethnography" [26].

V. Naumenko paid much attention to the organization of pedagogical courses for teachers. To expedite this work, he suggested "... to divide the courses into the district ones so that each district could arrange monthly courses for the teachers of their own districts, and to devote all their efforts to teaching the Ukrainian language ..." [27].

With the aim of territorial extension of the courses for the training of teachers for the school Ukrainization, V. Naumenko suggested several rational steps: shift work of the heads of the district courses; urgent preparation of district courses methodologists for 70-hour lectures that could be taught in provinces.

He personally develops a teacher training program for the Ukrainian school. For example, in teaching literacy V. Naumenko considered it necessary to familiarize the students with the methods of explanatory reading, the peculiarities of Ukrainian writing and to offer reading materials.

The Methodist advised to devote the second part of the courses to teaching arithmetic in the Ukrainian language. In addition, V. Naumenko considered it necessary to teach a brief course on the history of Ukraine, on the history of Ukrainian literature, especially in the 19th century, further on the geography of Ukrainian and the Ukrainian language.

The Methodist emphasized the importance of the course leader personality. "The trust and the authority acknowledgement of the courses teacher is of utmost im-



portance. If there is no such trust and authority, then the work becomes a formality, a toy”, V. Naumenko warned. In the case of selection of methodological courses leaders V. Naumenko paid great attention to the “conscious Ukrainian intellectuals”, who was interested in the effectiveness of the process of Ukrainization of education [26].

## 4 Conclusions

Thus, V. Naumenko, who was entrusted with the case of Ukrainization of the schools of the Kyiv educational district, determined the conditions for reforming the school and the content of education, as well as the ways of introducing theoretical foundations into the public school practice. According to the teacher, solving these tasks required special training of teaching staff, support of the progressive Ukrainian intelligentsia, and conscious attitude of the people to the reorganization of education, taking into account the territorial location of the educational institution in the process of Ukrainization.

Active public activity, scientific and educational work, development of appropriate programs and creation of textbooks for public schools – each of these activities was a kind of stone in creating the foundation for Ukrainian education. V. Naumenko’s role as one of the founders of national education was both in the scientific and theoretical substantiation of the foundations of Ukrainian schooling and in the practical implementation of educational ideas in the life of the Ukrainian population.

The study does not cover all aspects of the problem. Linguistic aspects of V. Naumenko’s legacy need further study and generalization. Also promising are studies of the scientist’s contribution to the development of archival and library affairs, a comparative analysis of pedagogical ideas of V. Naumenko and his socio-cultural activities with other representatives of domestic and foreign progressive intelligentsia.

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## Origins of inclusive education of students in Ukraine

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**Abstract.** This study deals with the author's version of the reconstruction of history of formation and development of the state approach to the education of children with disabilities (or special educational needs) in Ukraine in the period 1920–2019. For the first time, a systematic coverage of the experience gained by Ukraine in correctional and rehabilitation work and education of such children and the individualization of education of students with primary academic failure at primary school. The contribution of Ukrainian teachers and psychologists to the development of special pedagogy is briefly covered. Particular attention is paid to the ideas of Yu. Hilbukh (1920–2000) in the context of primary school education for students having difficulties in mastering the curriculum, which we consider a variable annunciator of inclusive education. The change of the pedagogical paradigm concerning the education of children with special needs is substantiated due to the introduction in 2017 of modern international principles of inclusive education. In conclusion, it is stated that the introduction of inclusive education indicates the modernization of Ukraine's humanitarian policy in the direction of further humanization of education. At the same time, it is emphasized that it would be wrong not to take into account the scientific and experimental base created in previous years for the study of such children and the experience of their education, rehabilitation and socialization.

### 1 Introduction

Since 2017, the ideas of inclusive education have been introduced in the educational space of Ukraine. They are aimed at ensuring the acquisition of knowledge by pupils or students with special educational needs “in the general educational environment at their place of residence”, which is an alternative to the previous residential school system, according to which they study separately from other children, or receive home and individual education” [1]. That is, in our country there is a renewal, a change in the pedagogical paradigm of education and upbringing of children who have special needs and disabilities, and therefore need an accessible educational environment, where, which is the most important, they “do not feel different”. The novelty of the pedagogical approach under the Convention on the Rights of Persons with Disabilities is to overcome “relative and environmental barriers that prevent the full and effective participation (of persons with disabilities) in society on an equal footing with others” [2]. According to the amendments made in 2016 to the Law of Ukraine “On the Fundamentals of Social Protection of Persons with Disabilities in Ukraine”, article 1 defines that a person with disability (formerly a “disabled person”) is a person with a persistent dysfunction that may lead to the restriction of his vital activity, as a result of which the state is obliged to create conditions for the exercise of its rights on an equal footing with other citizens and to ensure its social protection” [3].

Ukraine has more than a century of experience in education, upbringing, medical support of children and youth with special needs (due to psychophysical disabilities), as well as rehabilitation and correctional work with their various categories. The beginning of the organization of the state system of special children education, or as they were used to be called in scientific terms of the early twentieth century “Children with developmental disorders” or “defective children” took place in the difficult 1920s. For reasons of tolerance, we will use the term “special” children. When Ukraine became a party of the International Convention on the Rights of Persons with Disabilities (2006), the use of terms that “degrade the dignity and worth of a person with mental and physical disabilities” [2] is considered inhumane and unacceptable [3]. For reasons of tolerance, we will use the term “special” children [3].

At the same time, a separate scientific branch began to be formed – the defectology (today – special or correctional pedagogy). At present, in Ukraine, on the basis of child-centered principles in the spirit of international conventions and the UN pacts (1975; 1982, 1995; 2006; 2017) on human rights and the rights of people with disabilities, educational principles are implemented according to which persons with disabilities have “dignity and the values inherent in all members of the human family and their equal and inalienable rights are recognized as the basis of freedom, justice and universal peace” [2]. In English texts of official international documents on human rights, the rights of persons with disabilities use the term “person with disabilities”, while in the legislative documents

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of Ukraine is common term “disabled person”, which is a Latin analogue, or even more tolerant term – “a person (child) with disability”. Thus, it is expedient to carry out a historical retrospective of Ukraine’s achievements and failures in the field of education of young people with special educational needs, to outline the motivation of the modern transition to inclusive education, which is the purpose of this study.

## 2 Literature review

The state and various professional aspects of the problem of education of “special” children in Ukraine at different historical stages of social development have been studied by such specialists in the field of special pedagogy as V. Bondar and V. Zolotoverkh [4], V. Hladush [5], M. Suprun [6], O. Taranchenko [7], I. Kravchenko [8], as well as historian of education M. Yarmachenko [9] and the author of the article [10–14]. At the same time, as a holistic subject of study, a systematic determination of the experience gained in Ukraine in correctional and rehabilitation work and teaching children with visual, hearing, speech, mental disorders as well as individualization of students with primary school failure is considered for the first time.

At the same time, as a holistic subject of study, the systematic reflection of Ukraine’s experience of teaching children with mental and physical disabilities and correctional and rehabilitation work with them, the implementation of individualization of students with primary academic failure within the secondary school is carried out for the first time.

## 3 Results and discussion

### 3.1 Prerequisites for the introduction of an individualized approach to the education of “special” children in Ukraine

Until the beginning of the 1920s, there were a small number of private or charitable institutions in Ukraine, which provided care for children with hearing, vision and mental problems [9]. Enthusiastic educators provided them with basic knowledge and taught them certain available craft skills. Such single institutions operated on an initiative basis [6, 9]. Only in the 1920s, with the attempt to build a social state in Ukraine (historically more precisely – the Ukrainian SSR), for the first time in the history of education the introduction of systematic measures for the care and education of children with mental and physical disabilities began on a national scale. A balanced differentiation of children was initiated, taking into account the physiological and age peculiarities of their body formation and learning abilities. Individualization of education and upbringing of children at this time became widespread in the form of psychologization of the educational process [15].

At the same time, it is impossible not to take into account the scientific and pedagogical prerequisites that have made it possible to implement a differentiated and

individualized approach to the education of children and youth, to the organization of their lives. The background and drivers of the implementation of such an approach at this time include the development and significant achievements of experimental pedagogy, which began in Europe and the Russian Empire in the second half of the 19th century. These include studies by V. Bekhterev, O. Lazurskyi, M. Lange, P. Lesgaft, V. Kashchenko, O. Nechaiev, M. Rumiantsev, I. Sikorskyi, as well as the results of the work of such foreign scientists as A. Binet, E. Clapared, W. Lay, E. Mayman, G. Richard, S. Hall. In their studies, the issues of determining and taking into account the individual characteristics of development (physiological, mental, sociopsychological) of a child were raised; adaptation of the learning process to the existing, genetic capabilities of the child; specifics of children with mental and physical disorders and the search for opportunities for compensatory education and training; fight against difficult upbringing. These ideas were actively spread and implemented in the Ukrainian lands of the Russian Empire. Scientific and practical development of certain educational issues was carried out mainly on the basis of personal initiative by interested teachers of Kharkiv, Kyiv, Odesa, universities, as well as the efforts of enthusiastic teachers and public figures who are not indifferent to the cultural and educational development of the people [16]. Although much was done in the study and episodic effective implementation of the results of experimental research on these issues until the early 1920s, but there was a lack of systematic and consistent approach and the connection between the individual efforts of scientists and practitioners-philanthropists [9]. And the organization and activities of educational institutions for “special” children depended entirely on the initiatives of patrons and philanthropists.

By the early 1920s in Ukraine there were no state scientific institutions that would conduct systematic, purposeful research on pedagogy [16], including special one, just as there was no network of state educational institutions for children with mental and physical disorders. Even in the Russian Empire the ideas on the need to create a state system of social assistance to children with mental and physical disorders, which would provide them with education, upbringing and treatment in special institutions, as well as a comprehensive study of such children, was repeatedly expressed by I. Sikorskyi, V. Kashchenko, G. Troshyn, A. Vladimirskyi, O. Shcherbyna, P. Melnykov, V. Vetukhov, M. Kotelnikov and others at meetings and conferences [14]. However, at that time the authorities failed to meet the needs of “special” children.

### 3.2 The first steps towards the humanization of “special” children education: 1920s

In 1920, one of the initiators of the renewal of the pedagogical process on a child-centered basis, Ukrainian pedologist O. Popiv in his program work “Declaration of the People’s Commissariat of Education of the USSR on social education of children” outlined the intentions of workers and peasants to change approaches to education

and upbringing. He wrote that, organizing a new “educational system of social education”, the task is to realize the pedological and pedagogical dream – to cover the whole life of each child with the right education, to finally realize the “rights of the child” [17]. In this aspect, the idea proclaimed in the mentioned document that “care should be provided to all children, including the sick and defective ones, “juvenile offenders” and whole groups of children who need a special educational approach, became fundamental [17]. The term “defective” child was common in both the Soviet and European scientific and educational space at least until the 1960s and was used to describe children with various disabilities. Similarly, the term “morally defective” child was widely used to describe offending or homeless children, but only until the 1930s. To adhere to the principle of historicism, we will use the terms that were used at a certain historical time in official materials. It should be noted that in the second half of the twentieth century, gradually, with the spread of the human-centered paradigm in social development in Europe, the use of terms that degrade or morally affect the human being was abandoned even in the scientific sphere.

It should be noted that the Code of Laws on Public Education adopted in the USSR in 1922 already approved the division of all children in the country into certain groups according to the state of their physical and psychophysical development [18]. “Normal” and “defective” children were singled out, and therefore the urgent need for education alongside educational institutions for normal (ordinary) children and educational institutions for physically, mentally and morally defective children was recognized. Responsibility for the work of such institutions was allocated to the Ministries of Education (then the PKE of the USSR) and the Ministry of Health (then the PKH of the USSR).

According to the type of anomalies in children’s development, they were differentiated into three subgroups (blind, deaf, with mental problems), and the state recognized the need to ensure “the interests of each of these groups of children” [18]. An important role was also played by the mass registration of the entire child population of the USSR initiated by the authorities, which helped to identify children in need of special living and learning conditions.

Thus, since the early 20s of the twentieth century problems of the “defective childhood” education began to be considered and solved in Ukraine at the national level as an urgent medical and pedagogical task. For this purpose, in accordance with paragraphs 255-261 of the Code of Laws on Public Education of the USSR for the first time in four major cities of Ukraine, namely in Kharkiv (then the capital of the Ukrainian SSR), in Kyiv, Odesa and Dnipropetrovsk the medical and pedagogical cabinets were created, called the MPC, aimed at: “1) conducting scientific examinations of the physical and spiritual nature of the child who enters the cabinet; 2) developing scientific and experimental issues of practice and organization of life of institutions for defective children” [18]. The tasks of the MPC also included conducting classes with the staff of the relevant institutions of social education (social edu-

cation – note) to prepare them to understand the nature of defective children and the development of “methods and manuals” [18]. The MPC activities, which lasted until the early 1930s, had a significant regional impact on the identification of “special” children, the introduction and distribution among educators of a pedological approach to their study and learning, thus contributing to the innovative, socially significant idea of individualization of education in Ukraine [10]. In the 1930s, instead of MPCs, medical and pedagogical commissions were set up at public education departments to examine children with disabilities or learning difficulties and refer them to appropriate educational institutions or treatment as needed. In the 1990s, such commissions were called psychological-medical-pedagogical consultations (PMPCs). Since 2017, in accordance with the project of introduction of inclusive education in Ukraine, a network of inclusive resource centers (IRCs) has been created, which replaced the PMPC, finally liquidated on September 1, 2018. IRCs are being built as fundamentally new institutions designed to identify special educational needs of children not on the basis of the international classification of diseases, as it was before, but on the basis of the international classification of functions of children with special needs. In addition, these centers should be more territorially accessible, because they create one center for no more than 7 thousand children living in the united territorial community (district), and no more than 12 thousand children who live in the city (the city district) [19].

IRCs are designed to ensure “the realization of the right of children with special educational needs aged 2 to 18 to receive preschool and general secondary education, including in institutions of vocational (professional) education and other educational institutions that provide general secondary education, by conducting a comprehensive psychological and pedagogical assessment of the child’s development, providing psychological and pedagogical, correctional and developmental services and providing their systematic qualified support” [19]. As of April 2019, 557 IRCs were registered in Ukraine [20].

From the legislative and instructive materials of the USSR in the mid-1920s, in particular from the operational plan of the Department of Social Education (Uprsozvykh) of the PCE of the USSR for 1925–1926, it appears that they have a separate section “Auxiliary School”, which indicated the feasibility of formation of the auxiliary schools’ network” [21], where children with learning difficulties and mental problems were to study. Based on Western European statistical calculations, according to which children in need of auxiliary school are 3 percent, for Ukraine the number of such children was determined at that time by more than 50,000 people [21].

The document also singled out the category of children who “are between the norm and pathology and who cannot be called abnormal in the literal sense” [21], but when they get to public school, they inhibit the “normal working flow”. The authors of the document emphasized that at the end of the 19th century in Western Europe, and later in Russia, special classes at schools and separate schools for such children began to be organized, “and

in Ukraine the network of such schools has not only not developed since 1914, but also the small number of these schools that existed before the [First World] War in Kyiv and Kharkiv, disappeared by 1922" [21]. Therefore, recognizing at the state level the need for special classes in ordinary schools, "Uprosvytkh considered it necessary and possible to start organizing auxiliary classes next year, and in large centers and entire schools ... for about 7,500 children" [21]. But due to lack of funding, this task was performed slow "on the local level".

The activities of the newly created Ukrainian pedagogical and medical-pedagogical state institutions, which took care of the primary differentiation of the child population on the basis of its examination and differentiation of children depending on the state and peculiarities of development, laid the foundation for purposeful development of medical-pedagogical support of various groups of children, including special "children". The main thing is that both in the educational environment and in society, humanistic ideas of perceiving an abnormal child not only as a person who needs care, but also as a person with his/her own individual and social needs, which can and should be socialized.

It is indisputable that the approach to the development of the education system declared in Ukraine in the 1920s was focused on the humanistic consideration of the diversity of children's characteristics and ensuring the social interests of all categories of children. At that time, it was socially and pedagogically expedient to create special, separate educational institutions for "special" children, where they could be provided with medical and rehabilitation care, and certain knowledge in accordance with their capabilities and state of health, and some work skills, in order to socialize in the future. And although due to the material and economic hardships of the first decades the communist authorities in Ukraine failed to implement all the declared, the creation of a network of boarding schools for the maintenance and education of "special" children at that time had no alternative and was a social achievement.

### **3.3 To the problems of school education in Ukraine (1970–1990)**

Before turning to the psychological and pedagogical ideas, which we consider as humanistic harbingers of modern ideas of inclusive education in Ukraine, i.e. the experimental experience and scientific concept of Ukrainian psychologist Yurii Zinoviiovich Hilbukh (1928–2000), let's briefly outline the current state of school education in Ukraine (1970–1980s).

According to V. Bondar, modern Ukrainian scientist in the field of special pedagogy, at this time in Ukraine, a theoretical concept of functioning of a differentiated system of special education and training of children with mental and physical disorders of all kinds has already been developed [4]. Favorable conditions have developed for the branching of the science of defectology (special pedagogy) into such independent scientific fields as deaf pedagogy, typhlopedagogy, oligophrenic pedagogy, speech therapy, which contributed to the development of theory

and practice of teaching and educating children with intellectual, visual and hearing disorders. Defectologists have studied various aspects of the life of "special" children in collaboration with physicians, educators and psychologists. I. Kravchenko claims that there was an improvement of educational work not only in a differentiated network of special educational institutions for children with various disabilities, which was in constant development, but also institutions of preschool education of such children [8].

In the studies [4, 5, 8, 9] it is noted that in the 1970s and 1980s significant positive changes in the structure of special schools (deepening the differentiation of children according to the degree of disorders and, accordingly, diversification of correctional and rehabilitation work with them), in educational, methodological and regulatory support of their activities, in the content of students' education. Special schools have moved to new curricula that provide "special" children with a closer connection with the life of society by increasing the amount of general knowledge and general work skills, the acquisition of practical life skills. The internal form of "special" children education remained the main form of their development and preparation for life in society.

If in the field of special education of "special" children, according to the experts, there was a general improvement in the specialized forms of their education and upbringing, then in the secondary schools at that time there was such a psychological and pedagogical problem as unsuccessful students, i.e. children who have no obvious psychophysical defects, but poorly mastered the curriculum [22]. In this context, it should be mentioned that since 1936 (and in fact since the early 1930s, when the authorities began official criticism of pedologists) pedological (or psychological-pedagogical) study of students in Ukraine, which was widely practiced in the 1920s years, stopped. With the official defeat of pedology as a scientific field and the persecution of its followers (in Ukraine they were representatives of Kharkiv Scientific School) issues of school failure, as well as issues of personality psychology, were almost not developed [11, 14].

Only in the 1960s did educators and psychologists begin to address the problem of failing students [22]. The first solution among Ukrainian pedagogues was made by the outstanding teacher-humanist V. Sukhomlynskyi, who on an intuitive and experiential basis in the conditions of a rural school created an innovative educational system for the development of preschool and primary school children, including those with learning difficulties ("difficult" or "stupid children"). He considered it unacceptable for a group of children to exist at school, "who would feel incompetent and incapable of anything", because he saw their bitterness of intellectual disability not only as a moral trauma but also as a direct cause of juvenile delinquency.

Working with such children, V. Sukhomlynskyi began to gather them every night (!) for several years (!) In the Fairy Tales Room created on his initiative and with the participation of the children themselves, where they listened to and composed fairy tales. "It was the work of children who came to school foolish and would remain unhappy for life, if not for this special work that improved their



brains”, V. Sukhomlynskyi wrote [23]. He called the poetic work of the students “a subtle, refined, tender school of emotional life”, which “creates tender sensitive parts in the child’s brain”, which contributes to the personal abilities’ disclosure. Based on the results of his pedagogical observations, he argued that “the joy of intellectual success . . . is the red thread of the whole emotional life of the student” [23], and therefore closely linked the development of cognitive abilities of students with the development of their emotional sphere: “The brain, which you managed to influence with a magical poetic word, acquires the ability to remember” [23].

Teacher’s advice on the development of “difficult” children thinking by means of poetic words, by developing their interests, encouraging learning through the use of accessible, emotionally colored tasks, creating an atmosphere of positive emotions and tolerance for such special children, active compassion and dialogue with them in the process of purposeful pedagogical “treatment” remain relevant, and therefore in demand in modern inclusive education [14, 22].

Among the scientists, representatives of the scientific and psychological community, Yu. Hilbukh was one of the first in Ukraine to address the problem of school failure. And it was he who contributed to the renewal in the mid-1970s in the “scientific rights” of psychodiagnostics (after a long ban that began after 1936) as an effective tool for studying the child [24]. Today he is considered one of the founders of psychodiagnostics in modern Ukraine [25].

### **3.4 Yu. Hilbukh’s contribution to the humanization of school education in Ukraine**

In the 1980s and 1990s Yu. Hilbukh, one of the few scientists, dealt with the problem of schoolchildren’s failure. His creative achievements are now rather forgotten than known. Although he and the staff of the Research Institute of Psychology of the USSR (now G.S. Kostiuk Institute of Psychology of the National Academy of Pedagogical Sciences of Ukraine, hereinafter – the Institute) obtained experimental results of researching the student’s personality, learning opportunities and ways of psychological and pedagogical assistance to individual students, became a milestone in the development of Ukrainian pedagogical psychology. Isolated publications about him belong mainly to his former like-minded colleagues [25], [22].

The first step in the return of psychodiagnostics to Ukrainian psychological practice is associated with the opening in 1975 at the Institute of Psychodiagnostics Laboratory under the leadership of Yu. Hilbukh. The scientific unit investigated methodological, theoretical and practical problems related to the creation of new tests, adaptation of known traditional methods, diagnosis of different populations of children and adults, as well as the introduction of psychodiagnostics in the practice of schools [26].

In the late 1970s, Yu. Hilbukh and his colleagues were the first in Ukraine to experiment with the introduction of so-called equalization classes at primary school in order to overcome school failure. Some aspects of this experiment, particularly in schools in Donetsk region (Donetsk,

Horlivka, Mariupol), were mentioned by one of its participants, Yu. Hilbukh’s colleague O. Penkova: “We selected students for equalization classes and obviously saw the whole tragedy of these children, who needed only more time to master the material, and they were sent to special boarding schools. As a result children and parents suffered. We observed these students during the school year, made student assessments and made corrections. It was a necessary and interesting work, that united us” [25].

However, in the early 1980’s, according to psychologist L. Kondratenko, the laboratory was closed. However, the publications [27, 28] show that Yu. Hilbukh continued to develop the problem of student failure in the framework of his doctoral study “Method of psychological tests and ways to improve it”, which he successfully defended in 1987. He substantiated and experimentally confirmed the provisions related to theoretical and applied issues of school and professional psychodiagnostics. The scientist interpreted it not only as a tool for determining the psychological diagnosis of the child’s personality, i.e. as an aspect of cognition of his mental personality, but also as “a tool for its psychological correction (if necessary, the formation of certain mental qualities) or ensuring its increased development” [26]. In general, the modern system of teaching and mental education of children, the scientist considered as a fairly spontaneous formation, within which has not yet developed a deep knowledge of the cognitive capabilities of the individual and special methods of implementing these capabilities in the educational process [26].

The concept of differentiated learning was based on the idea that the decisive factor in the child’s learning and mental development is played by the time factor and proved the scientific hypothesis that primary school failure is rooted in the child’s insufficient readiness for learning. According to the survey, in the preschool age such children experienced certain adverse circumstances that artificially delayed their development . It should be noted that the circumstances in the scientist’s concept did not play a significant role (pregnant mother’s disease, child’s minimal brain dysfunction, his/her own severe illness in preschool, poor developmental conditions, slow mental functions), the psychologist was interested only in the current state of the child and ways to correct it.

In 1989, the work of the unit called “Laboratory of Psychodiagnostics and Psychology of Differentiated Learning” at the Institute was resumed. Yu. Hilbukh, a well-known psychologist, Doctor of Psychological Sciences, Professor, was again appointed the Head of the Psychodiagnostics Laboratory. According to the scientist, the aim of the renewed scientific unit, was “the purification of the idea of differentiation of students by certain types of classes from vulgar distortions, on the one hand, and stereotypical, one-sidedly negative approaches to it, on the other hand”, and also “introduction into school practice of the laboratory-developed psychological and pedagogical system of differentiation of the educational process in the secondary school”. It should be noted that the laboratory staff also contributed to the justification of the need to in-

roduce the position of school psychologists in Ukrainian schools, which was implemented in 1991–1994 [14].

Source analysis suggests that even before the official resumption of the department, since 1987 the so-called problem group for the diagnosis of mental development of six-year-old children, consisting of scientists from the Institute led by Yu. Hilbukh, began an experiment to differentiate learning in the primary level. 7 urban and 3 rural schools took part in the experiment [24]. The following year, the number of experimental institutions increased to 70, and since 1989 the experiment began in several schools in Belarus [29], Kazakhstan, Russia [30]. According to Yu. Hilbukh, in the 1991–1992 academic year, 400 schools took part in his experiment [30].

Scientists realized in practice the idea of introducing a system of classes at primary school, consisting of 3 types, and provided for differentiated acquisition of the first classes based on the results of the application of a set of portable test methods developed or adapted in the laboratory of differentiated learning. “Depending on the current level of development of children’s abilities and in coordination with the parents, children were included in one of the three types of forms”, Yu. Hilbukh wrote [24].

Differentiation was performed on a psychodiagnostic basis. The first type of classes, selected by the scientists, usually included children whose mental development corresponds to the age norm. According to the researchers, such children make up about 65 percent of the total [24].

The second type consisted of accelerated learning classes for children with advanced mental development. Training took place according to the formula “four years for three” for the six-year-old students and “three years for two” for seven-year-old students and according to the “compact programs”. To ensure the further mental development of such children, they were about 14–15% [29]; 15–18% [31]; 15% [30]; 15–20% [32] various forms of creative and independent work, competitions, and distribution and cooperative tasks are widely used [32].

Yu. Hilbukh substantiates the thesis that the classes of accelerated or in-depth learning create “favorable preconditions for the gifted child individuality. This is a real way to increase the intellectual potential of society”, which has long been realized abroad [29]. The scientist argued that after graduating from elementary school, students of this class should be able to continue to study in-depth educational programs in accordance with personal inclinations and abilities. Such education in the 5th–10th grades was to be differentiated through optional classes, as well as through the creation of a set of subject cycles, such as physics and mathematics, chemistry and biology, science and humanities (linguistics, literature, art, history), polytechnics, computer technology, technical modeling, etc.

We consider these considerations of the scientist to be a harbinger of the specialized education implementation in high school, which began in Ukraine in the 2000s. It should be noted that Yu. Hilbukh provided for the advanced training of schoolchildren from the 5th grade, but for those students who received primary education in the classes of accelerated learning. Obviously, his approach is

deeper in the sense of differentiation and is still awaiting implementation.

According to Yu. Hilbukh’s conceptual approach, the content of educational and subject cycles was to be outlined in special programs, which would be a supplement to the current curriculum and programs. In collaboration with his colleagues, the scientist implemented the idea in a number of curricula for grades 5–10 (at that time there was a 10-year secondary school – note) for the schools with Ukrainian and Russian languages of instruction (issues 4–9 of series “Educational process in differentiated classes”, 1992–1993), and psychological and pedagogical justification of ways to implement differentiated education was set out in publications for teachers [33].

Recognizing differentiated learning as the main prerequisite for the implementation of the key principle of pedagogy – the principle of individual approach to students, i.e. taking into account their individual psychological characteristics in the educational process [32], Yu. Hilbukh in the early 1990s argued that not only secondary and high school students, but also primary school students should be involved in the process: “Today, in some regions of Ukraine, several hundred of “differentiated” classes are opened per year. At the same time, they forget that the first school years are the foundation not only of education, but also of development of abilities. And it is unlikely that differentiation in the secondary and high school can be effective under its absence at primary school” [29]. And in primary school, the scientist noted, differentiated learning was implemented only or mainly in the form of clubs and extracurricular activities in amateur art, labor education, physical education, “intra-class differentiation”, and therefore the scientist stated: “They are trying to build differentiated learning on the basis of taking into account only the interests and inclinations of students, ignoring the existing individual differences in the development of intellectual abilities” [32].

Yu. Hilbukh constantly argued that “intelligence and abilities can develop only when the children are constantly straining their abilities, working at the limit of possibilities ... no problem when something fails, the main thing – that the child was aimed at achieving new heights in learning” [29]. To help senior students master the rational methods of educational and work activities and to develop their mental abilities, the scientist wrote a book “How to learn and work effectively. Scientific management for high school students” (1993), where he presented psychological and pedagogical recommendations for the development of observation and attention, learning scientific terms, solving problems, training spatial attention and “rationalization of memory” etc. [34].

Finally, the third type of primary school according to the Yu. Hilbukh’s plan consisted of increased individual attention classes (IIAC), which included children poorly prepared for school, “pedagogically neglected” [24], or with minor deviations in mental development. Such children quantitatively make about 15–20% of the total number of entrants; 15–18% [32].

The peculiarities of the IIAC work included:

- maximum number per class – 16–18 students, compared to the generally acceptable 30–35 students,
- high requirements for the professionalism of the teacher,
- implementation of training in IIAC on the basis of correctional methods developed in the laboratory of psychodiagnostics (authors – Yu. Hilbukh, L. Kondratenko, L. Korobko) [29],
- giving a teacher the right to follow the curriculum of a regular four-year (or three-year) primary school, to change the educational process in such a way as to contribute as much as possible to the development and educational success of students.

Great importance in the work of KPIU was given to the organization of teacher-student interaction in class and in extracurricular time, the formation of a friendly class team, a friendly climate.

Yu. Hilbukh attributed “slow students” to the children with insufficient preparation for school [22]. As the participant of experiments, the employee of psychodiagnostics laboratory L. Kondratenko explains, that in course of check of children-entrants the scientists distinguished slow and unhurried children. Children with different levels of readiness for school and learning abilities were considered unhurried. Their unhurried manner in performing educational tasks was determined by the inert type of higher nervous activity. Such children work at a somewhat slow pace, but the depth, accuracy and quality of knowledge is not affected [22]. Others are slow children. They are not able to acquire knowledge at the pace offered by the school, not because they think slowly, but because they make mistakes at every step, and because of these mistakes their schooling resembles a path in a labyrinth. In order to find a way through the labyrinth such children need a lot of teachers’ help and, as a result, a different teaching method, a slower pace of mastering new material. In a regular class, such a child will face the fate of a failed student, whose lag behind peers only grows and deepens every year.

It should be noted that already in 1994, specifying the method of completing differentiated classes on the basis of psychological observations and experimental results, Yu. Hilbukh came to the conclusion that it is necessary to create the fourth type of classes for children with mental retardation (MRC), which are 2–3% of the total number of preschoolers [32]. Based on this, the laboratory addressed the Ministry of Education and Science of Ukraine with a proposal to open such types of classes in the secondary schools [32]. It was carried out in the cities of Rivne and Zaporizhia. The MRC opened there at usual schools was for 10–12 pupils who were taught by the teacher with defectological education [32]. This example shows the steps taken to implement the ideas of inclusive education in Ukraine in the early 1990s.

Conducting the experiment, scientists set the following tasks:

- ensuring constant confidence of children in their learning ability, enjoyment of intellectual stress in the learning process,

- creating comfortable living conditions for children and taking measures to strengthen their health,
- promoting the general development of the individual; implementation of correction and training for the development of cognitive abilities [22].

The first and second tasks were implemented in the process of organizing educational work, the third combined the influence of intellectual background with correction, and the fourth was solved through the use of developmental tasks, individual and group classes of psychologist with children, game trainings and thinking development course. It began at the second year of study [22].

According to L. Kondratenko, even during an experiment with equalization classes in the late 1970s, scientists recorded a psychological trap that children of all types of classes fell into, aimed at correcting the already found failure. Studying in such classes formed from children losers who already “felt the bitter taste of school failure and developed certain methods of psychological protection, the main of which was the internal “habituation” to low self-esteem and inability to learn the program” [22]. After some time of constant humiliation, such a child learned poorly not only because he/she could not, but also because he/she no longer wanted to learn, not expecting anything from the learning process, except new and new annoyances. It was these observations that prompted researchers to propose a further way in the 1980s and 1990s that they believed avoided the traumatic experience of school failure: children were singled out not for failure but for readiness for school.

We consider the thesis to be a significant conclusion of the experimental work formulated by L. Kondratenko: “While equalization classes acted as groups of specially organized correctional education for children (equalization classes) who did not cope with the first grade program, they, even despite the will of experimental training organizers, turned into oases of trouble, reservations for “uncomfortable” children” [22]. Therefore, starting the experiment in the late 1980s according to the concept of Yu. Hilbukh, the laboratory developed new approaches to differentiation, based on the results of pre-school testing and for the first time implemented a purely psychological approach to the division of children into different classes, based not on the level of their academic knowledge, but the level of cognitive abilities formation.

The typology of “unsuccessful” children proposed by the scientists of the laboratory was also original, which was not based on the usual “deficiency” approach, which determines the lack of a certain ability formation, responsible for certain school abilities of children. Instead, the typology was based on the “effective approach”, which basis was the effectiveness of educational activities [22]. Therefore, “poorly prepared” students were divided into 3 main groups: children with insufficiently formed motives for learning (students who do not work enough); children with low educational efficiency; children with a combination of low motivation and low efficiency of educational activities. However, according to L. Kondratenko, this typology from the beginning had a certain contradic-



tion with the declared pre-school approach to identifying school failure of children, as the effectiveness of educational activities can be determined only by the results of these activities [22].

Experiments have also shown that a significant pedagogical problem was the professional unpreparedness of teachers to work in both accelerated classes and IIAC. It was difficult to develop methods of teaching individual subjects in different differentiated classes, because most teachers were not psychologically ready to change their own approaches to learning, to use fundamentally different teaching methods in different classes of the same parallel [22]. To facilitate their work, the staff of the laboratory developed manuals and recommendations, conducted training courses for teachers to study at IIAC. Scientists also constantly monitored the work of experimental classes [32].

The references show that in 1989–1994 under the leadership of Yu. Hilbukh scientists of the psychodiagnostics laboratory carried out large-scale experiments to introduce differentiated education of children in primary school in Ukraine, Russia, Belarus and Moldova [25]. Materials were found, according to which, for example, in Tiraspol, the experiment of differentiation of first grades and organization of education in them continued until the end of the 1990s [35]. In particular, in the work of the secondary school No. 8, under the scientific guidance of the psychodiagnostics laboratory, special programs and educational complexes were developed, according to which teachers and school psychologists could work with certain categories of children. The experimental program “Development of the child’s personality taking into account his real capabilities on the basis of psychodiagnostics and differentiated learning” was implemented. And from 1993 to 1998 they launched an experiment, and teachers and administration passed through the “psychological and pedagogical school of Yu. Z. Hilbukh” [35]. Describing the course of this experiment, the laboratory scientist L. Manylova noted that it was based on humanistic principles of “timely identification and comprehensive cultivation of students’ abilities” and aimed at introducing “differentiated education and comprehensive individualization of the educational process” [36].

From the report of the psychodiagnostics laboratory of the Research Institute of Psychology of Ukraine for 1991 it is possible to learn that 394 schools in Ukraine and 112 schools from other states of the former USSR took part in the experiment at that time. The object of in-depth research were the following Ukrainian schools: Secondary schools No. 52, 96, 157, 159, 178, 251, 254, 286, 288 in Kyiv, Secondary schools No. 50 and 91 in Donetsk, Secondary schools No. 14, 19, 54, 65 in Horlivka, Donetsk region, Secondary school No. 150 in Dnipropetrovsk, Secondary school No. 6 in Novomoskovsk, Secondary school No. 103 in Kryvyi Rih, Dnipropetrovsk region, Secondary school No. 149 in Kharkiv, Secondary schools No. 12, 23 in Rivne, Secondary school No. 17 in Vinnytsia, Golynska Secondary School, Ivano-Frankivsk Region, Secondary School No. 7 in Lebedyn, Sumy Region, Secondary School No. 20 in Luhansk [37].

The report also states that the psychological and pedagogical system of differentiation of students developed in the laboratory in accordance with the current level of their mental abilities is “an effective means of ensuring the harmonious comprehensive development of the individuality of students and student groups” [37]. Psychologists stated “profound structural changes in the cognitive activity and moral sphere of students”. The experiment showed that in both areas students have large reserves that cannot be used in the traditional organization of educational process. The control assessments of differentiated classes students, conducted in a number of schools in Donetsk, Dnipropetrovsk, Rivne and Kharkiv regions, proved the significant advantages of the described system.

At the same time, there were still problematic aspects that were clarified during the research. Although the level of knowledge of IIAC graduates (according to the results of tests of the Ministry of Education and other audit commissions) was sufficient for successful secondary school education, in the following classes only a few of IIAC children remained at the same level of academic achievement at the end of their studies, as they had at primary school. In general, such children became classic low-performing students, who constantly balanced between grades “2” and “4” [22]. L. Kondratenko describes the following strange situation that arose during the experiment: the aim of the IIAC was to prevent failure, which was formed on the basis of unpreparedness for schooling. This goal seems to have been achieved “and at the time of passing to primary school there seemed to be no real factors for the secondary failure, which is formed on the basis of lack of knowledge, skills and abilities necessary for further learning” [22]. However, in reality the failure still occurred. Faced with the first difficulties in learning in 5th–7th grades, the IIAC graduates showed helplessness, inability to solve problems on their own, and “showed all the signs of a deficient personality with clear manifestations of personal victimhood”. The scientist writes that the academic failure was sometimes preceded by manifestations of general failure: low self-esteem, inferiority, deficiency, insecurity, lack of intellectual effort, and, as a result there were gaps in knowledge.

L. Kondratenko admits that: “The results of IIAC’s activity showed that the work aimed only at developing the learning abilities of students with insufficient readiness for school gave only a temporary effect, as it did not provide a permanent positive polarity of the whole system of functioning of a child as an individual and as a personality” [22].

Other psychologists, S. Goncharenko and L. Manylova, also wrote about the difficulties faced by the experiment participants [36]. They stressed that the effectiveness of IIAC students depends on external factors (errors in the staffing of such classes, the inability to provide scientific support by psychologists of each IIAC, project funding), and the specifics of the personality of IIAC children, most of whom were psychophysiologicaly immature and its complicated both learning and communication [5].

Despite the difficulties and problems of introducing differentiation at primary school, Yu. Hilbukh defended the idea of the expediency of differentiating students by their abilities, but subject to the principle of democracy through the actual provision of all categories of children “basically one amount of knowledge with high achievement”. Establishing the growing level of social stratification in Ukrainian society, typical of the 1990s, another Ukrainian psychologist H. Ball, wrote that the Yu. Hilbukh’s classes of increased individual attention really provide an individual approach to each child, promote individualization, which defined “fundamental characteristics of free personality development strategies” [38].

We consider his book “Temperament and cognitive abilities of a student: psychology, diagnostics, pedagogy” (1992; revised and corrected edition in Russian, 1993) to be a kind of generalization of scientific views and experimental research of the scientist connected with practical realization of the personal approach to the child-student, which reveals his approach to solving the problem of rapid diagnosis of primary activities of students: experimented achievement tests, recommendations for the diagnostics of oral responses of students in the process of testing their knowledge, diagnosis of the zone of proximal development and level of actual development of the child, his/her educational activities, means of correction of inattention, development of memory, observation, imagination, i.e. effective tools for “full realization of cognitive abilities that the student has at this time, ... and creating the most favorable conditions for further development of these abilities” [33], as well as provisions for the construction of “long-term individual characteristics as guidelines in the “current interpretation of student learning behavior”.

From an interview with a leading researcher of the modern department of psychodiagnostics and psychological information of the Institute of Psychology of the National Academy of Pedagogical Sciences of Ukraine, Doctor of Psychology L. Kondratenko, it was found that after Yu. Hilbukh left Ukraine in 1995, the experiment was collapsed. Interview with L. Kondratenko were conducted by the author of the article in August 2017 and in October 2018 in Kyiv.

In 1996, after Yu. Hilbukh’s departure, his book “School Class: How to Know and Educate its Soul” was published, co-authored by O. Kyrychuk. It reveals to the teachers the understanding of the class as a kind of small group, as an organism, i.e. “holistic mental individuality” [39]), which requires study and characterization, because the class becomes a center for the child, where it is socialized. Therefore, the teacher must learn to trace and diagnose the processes in such a small group, to determine the patterns of its functioning and development. The content of the book was aimed at helping the teacher, and its analysis, in our opinion, is currently relevant.

In 1980–1990 another Ukrainian psychologist A. Furman worked on the issue of psychodiagnostics of intelligence in the system of education differentiation. He participated in the development of programs for the 5th grade with the advanced learning of basic subjects (CAL) [40], studied the activities of classes with accelerated learning

(ALC) and substantiated the conclusion that 9-year-old students who graduated from ALC, are able to learn not only one, but all subjects advanced and its normal for them [40], as their mind is “programmed to a theoretical (conceptual) level of cognition”, another level of knowledge acquisition is superficial to them, such that “does not fully develop their mental and volitional qualities”. Another current conclusion of the scientist was the statement about the extremely important role of the first teacher in the mutual adaptation of students and teachers in the 5th class, because the first teacher is the link that connects learning for children “before” and “after” [40], so it is advisable that the first teacher continues to teach at least one subject in the 5th grade.

Based on his own experience of using the known intelligence tests, in his book “Psychodiagnostics of intelligence in the system of learning differentiation” A. Furman made “almost the first in the history of domestic psychological science and school practice” attempt to allow teachers to test themselves in “psychological diagnosis level and features of intellectual development of students and approach the scientifically sound implementation of a system of differentiated or individualized learning” [40]. He introduced the technology of using tests of mental development of students, who are the most accessible to teachers. Along with a description of the technique of holistic test examination of students, the scientist argued the possibility of using tests to create different types of classes (lyceum, gymnasium, general education, increased individual attention) and differentiated learning groups to teach gifted and retarded students. The test methods, technologies of conducting and processing test examinations, as well as interpretation of their results, recommendations for differentiation of the educational process played an important role in spreading the psychological component of education humanization in the first years of Ukraine’s independence.

## 4 Conclusions

As a result of Ukraine’s choice of state policy, focused primarily on the humanization of life in the country, educational policy was aimed at creating and providing conditions for the development of the individual from the first years of sovereignty. The search for personality-oriented learning strategies, started by V. Sukhomlynskyi in 1950–1960, was continued by innovative teachers in 1970–1980 [41], as well as the research of Ukrainian scientists in the field of students’ learning individualization, which contributed to the intensification, were actualized. This research in the 1990s introduced the differentiation and individualization of school education, including with the use of psychological and pedagogical methods, psychological diagnostics and the development of corrective psychological and pedagogical strategies of personal development.

Yu. Hilbukh belongs to the bunch of Ukrainian scientists, whose achievements in the theoretical and applied dimensions provided individualization of schooling, contributed to the introduction of psychodiagnostics into school practice, and rooted in the minds of educators the

need for psychological knowledge of compulsory educational tools. He and his colleagues from the Laboratory of Education Differentiation of the Institute of Psychology of Ukraine substantiated and argued the need to introduce psychological support for students in Ukrainian schools, which led to the introduction of school psychologists (early 1990s), the creation of a separate Psychological Service of Ukraine as well as the personality-oriented paradigm in Ukrainian education, one of the modern manifestations of which is inclusive education.

For the first time, the development of the experience of care and education of children with psychophysical problems in Ukraine in accordance with the state paradigm of their separate education is systematically covered in the problem-chronological dimension. At the same time, the research of Ukrainian scientists on the individualization of education of students with primary academic failure at primary school is reflected, which are characterized as certain predictors of the movement towards inclusive education (table 1).

The development of inclusive education in Ukraine in accordance with the concept of the New Ukrainian School (2017) manifests not only the modernization of the state's humanitarian policy, but also a change in the pedagogical paradigm. The main core of change is the implementation of humanistic child-centeredness of all types and forms of education. The principles of inclusive education are consistent with global humanistic principles for the education of children with special needs.

At the same time, we should not forget that the implementation of inclusive education in Ukraine has become possible due to the previously created scientific and experimental base and the long-term experience of educators and socialization of children with special needs. These achievements of Ukrainian pedagogy, firstly, became the basis of modern educational modernization in the field of education, and secondly, they remain a source of ideas for the future.

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**Table 1.** Generalized reflection of the development of approaches to the problems of children with special needs in Ukraine

Type of paradigm	Years	Purpose	Responsible for implementation
Isolation of children with psychophysical features from the child population, their differentiation by types of disorders	1920–1930	For the first time in the history of national education the organization and system of guardianship, training and possible rehabilitation of children with special needs in the form of creation of the state various profile boarding specialized institutions is carried out.	State
Deepening the study and differentiation of children with special needs and accordingly expanding the network of specialized educational and correctional institutions	1940–1990	Development of scientific research in Ukraine in the field of studying the features and pathologies of child development, development of theory and methods of teaching, education and socialization of such children.	State
Within the same paradigm of the origin of ideas of inclusive-individualized approach	1980–1990	Introduction of the experiment on differentiation of children entering the first grades of secondary schools on the basis of their psychological testing in order to determine which program – typical or individualized (for children with advanced mental development, and children with learning difficulties who needed more pedagogical attention) it is more expedient for them to study.	State
The new paradigm is the paradigm of inclusive education	Since 2017	Introduction in Ukraine of the practice of including children with special needs in the educational process of ordinary secondary schools in accordance with modern international principles of inclusive education and the gradual reduction of the network of boarding (isolated) forms of their education and socialization.	State together with private and public parents organizations

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## The problem of preserving and strengthening the occupational health of the teacher: a historical aspect

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**Abstract.** The article is devoted to the retrospective analysis of the problem of the teacher's occupational health maintaining and strengthening. On the basis of the study of the psychological and pedagogical massive of sources the state of the development of the problem and the peculiarities of the research of the determined problem in history of the scientific thought and practice are defined. The periods and directions of the professional health of the teacher preservation and strengthening research problem are singled out and characterized. New views of the scientists who studied the problems of the optimization of the efficiency, manufacturing safety, improvement of the efficiency, overcoming of the professional weariness are presented. The experience of the pedagogical education of the beginning of the XX century in Russia and the Committee of the study of the teacher labour in particular, the study of the conditions and mechanisms of the professional disadaptation appearance, professional deformations, determination of the professional difficulties, their influence on the teacher's state of health are described. The positions of the scientists-analyticians in the researched problem are shown. The crucial attention is devoted to the analysis of the A. Makarenko, V. Sukhomlinskyi views of the questions of study of the reasons of the teacher's health deterioration, the ways and means of the emotional stress removal, improvement of his psychological wellbeing. The special literature for the period from the middle of the XX century till the beginning of the XXI century on the problem of pedagogy and psychology of health, maintaining and strengthening of the teacher's health are analyzed. The circle of problems that need the research of the concrete ways of maintaining and strengthening of the teacher's health problem solving is determined.

### 1 Introduction

Today, the school needs a competent teacher, capable of personal and professional growth, to maintain a "professional form", to achieve professional longevity. The state of the teacher's occupational health affects the results of the pedagogical activity, influences the stability of the results of work, and determines the self-efficacy of his personality. In addition, occupational health largely depends on the health status of students, their socio-psychological well-being, and their "viability". A teacher with low occupational health is unable to create a psychologically safe educational and learning environment at school. He cannot shape the students' health culture because it requires a personal example.

The professional health of the teacher is an integral characteristic of the functional state of the organism, the global mental state of the person, characterized by the dynamic harmony of internal experiences and the related effectiveness and success of pedagogical activity, the ability

to withstand the negative factors that accompany this activity [1].

Therefore, the issue of preserving and promoting the health of the teacher is one of the priorities in his life and professional interests. Preserving and promoting the health of the teacher is an urgent problem of pedagogical and psychological science, and at the same time a strategic issue of the modern school.

The problem of health promotion and preservation has a long history. The study of it has always been given attention at different stages of the development of human society. Doctors, ecologists, valeologists, philosophers, educators, psychologists, representatives of various fields of science investigated the phenomenon of health, its essence, to learn how to manage it, to economically use health during the life and professional activity and find means for its preservation and strengthening.

In scientific sources there are works concerning the problem of formation of health culture in the history of theoretical thought [2], the state of elaboration of the problem of forming a healthy way of life of the future teacher [3], research of the phenomenon of "burnout" in retrospect [4], historical aspects of occupational health of specialists in industrial sphere [5].

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The historical aspect of preserving and promoting the occupational health of the teacher has not yet been reflected in the psycho-pedagogical literature. *The purpose of the article* is to analyze the state of development and genesis of research into the problem of preserving and enhancing the teachers' occupational health in the history of scientific thought and practice; identify positive ideas for creative use in modern conditions.

Chronological boundaries of the study: a period of the beginning of the XX century - beginning of the XXI century. The definition of the lower boundary is connected with the emergence of the movement for scientific organization of work the development of issues of occupational health of workers. The and upper limit of the study is due to the emergence of a series of psychological and pedagogical studies on the problem of preserving the occupational health of the teacher.

## 2 Methodology of research

The methodological basis of the study covers the following scientific and theoretical approaches: historical-genetic, interpretative-analytical, historical-systemic and historical-comparative to formulate conclusions and identify positive experiences for the use in the system of modern pedagogical education; search and bibliographic – to obtain factual material from scientific research on the problem of preserving and promoting the health of the teacher; historical and pedagogical analysis, which made it possible to substantiate the genesis of the problem under study; biographical – to analyze the activities of scientists who have promoted the need to preserve and research the occupational health of teachers. The choice of research methods takes into account the interdisciplinary nature of the work. The following methods were used in the study: the dialectical method – to consider the problem of the study in all its relationships and dependencies; comparative-historical and hermeneutic methods – for analysis, synthesis, generalization, systematization of scientific sources, legal framework of the problem of preserving and enhancing the occupational health of teachers, which ensured the insight into the nature and state of development of the problem under study, formulation of basic provisions and conclusions; chronological and diachronic – to track the development of ideas for preserving and promoting the health of the teacher; a prognostic method that made it possible to determine the possibility of using positive ideas of the past in the present conditions.

The source of the study is: documents on pedagogical education scientific researches (articles in scientific periodicals, monographs, theses, textbooks and manuals) of foreign and domestic scientists on the problems of preserving and promoting the health of the teacher; documentation of institutions of higher and postgraduate pedagogical education.

## 3 Results of research

### 3.1 The research, in which the study of teachers' health preservation and strengthening problem was initiated

Occupational health is one of the factors of occupational suitability, an important condition for the efficiency of work and an indicator of "quality" of professional life. The development of occupational health issues for workers dates back to the early twentieth century and is associated with the emergence of the Movement for Scientific Organization of Labor. Its founder, American engineer F. Taylor, in his work, proceeded from the concept of "economic man", considered the worker as an element of the production process. without being interested in his physical and mental well-being [6]. One of the leaders of the movement for the scientific organization of labor, F. Gilbreth saw the task and meaning of the scientific organization of labor is that everyone is engaged in the thing that most contributes to the development of his physical and mental abilities. Everyone should feel the joy of work, which is the main success of the Scientific Organization of Labor [7]. And he considered the health of workers as the first condition of work and its productivity. Therefore, to maintain the health of workers, it is necessary to rationalize their workplace, provide them with the necessary rest, reduce the impact of various fatigue. F. Gilbreth initiated the Day for Combating Fatigue, which was held annually in December. He insisted on the involvement of psychologists to solve the problems of staff in the workplace.

Psychological aspects of the scientific organization of work were also interesting for L. Gilbreth, who was the first woman in America to receive a doctorate in psychology [8, 9]. She noted that good organization of work should consider the body and soul of the specialist in unity, focus not only on the professional, mental and moral development of workers but also form their desire for a healthy lifestyle (Gilbreth, as cited in [5, p. 481]. Occupational health issues at one time or another are being developed in England and Germany. Scientists in these countries investigated the problems of optimization of work organization, production safety, the problem of increasing vital energy, the phenomenon of occupational fatigue and its impact on performance.

The interest in the problem of preserving the health of employees led to various studies in various fields of knowledge, the creation of scientific laboratories, institutes and more. In the early twentieth century in Russia, the topic of occupational health was presented in the scientific-practical activity of V. Bekhterev, A. Gastev. At the initiative and under the direction of V. Bekhterev in Petrograd, the Institute for the Study of the Brain and Mental Activity was established in 1918, which included a Laboratory. The main task of the laboratory was to develop the issues and measures of harmonization and improvement of a work process, occupational health, and health in general. The Institute of the Brain organized the publication of popular scientific books on various issues of general hygiene and occupational health [10]. A. Gastev,

the founder of the Central Institute of Labor in Moscow, paid special attention to ensuring the physical and mental health of workers. For this purpose, he believed, it is necessary to create the necessary working conditions: prevention of fatigue; training of the employee's physical properties; development of his observation, motor abilities, willpower, ability to manage their own time and so on. The main thing – to maximize the power of professionals in combination with the preservation of their strength and health, economical consumption of their energy [11]. At this time I. Mechnikov noted that professional activity influences life expectancy and, without a doubt, influences the state of mental and physical health of the subject of professional activity – occupational health (as cited in [5, p. 485]. At the same time, occupational health is considered to be a component of a professional's suitability.

The 1920s years were marked by a lively discussion about the ways of developing a managerial science, which in one way or another touched upon the issue of occupational health, namely: the question of the relationship between work motivation and health of employees; the role of stimulating workflow; the need for an objective and thorough study of performance and the factors that affect it, etc.

### **3.2 Retrospective analysis of the problem of teachers' health preserving and strengthening (early XX – 70s of XX century)**

The results of the study of the scientific literature give us an opportunity to state that in the early twentieth century, considerable experience of pedagogical education was developed in Russia. In 1910, at the First Congress of Experimental Pedagogy was held in Moscow, where a student of Leipzig University T. Markaryan made a report on the problems of a teacher. Subsequently, he defended a doctoral dissertation in which a significant place was given to the pedagogical direction – didascology, which was interpreted by the author as a complex science about the teacher. Didascology argued that it was impossible to treat the child seriously and the teacher unseriously. This scientific area was supported in post-revolutionary Russia. In 1920, under the leadership of T. Markaryan at the Central Pedagogical Institute in Moscow, a Commission for the Study of Teachers was established, and in 4 years a program of activity of an independent teaching institute program was proposed for discussion [12].

All the work with the teachers, organized by the Teacher's work Learning Commission, had to help teachers become aware of their capabilities and be ready to present themselves (self-presentation). It relied on the psychological and cultural foundations of pedagogical work, because it offered the training of a teacher who was able to own and be able to "grow up" with children of children's culture. The methodological foundations of the research had been identified, a number of theoretical ideas had been put forward and substantiated (about the need for a comprehensive approach to the study of the teacher's problem, about the development of his personality, about self-education and the need for professional training of the

teacher) [13]. In 1925 the book "The study of the professions of intelligent work" [14] was published, and a year later – the book "The work and health of a teacher" (edited by I. Ravkin and Y. Sokolov) [15].

A group of researchers (A. Shafranov, M. Rubinshtein, V. Kashkadamov, and M. Rybnikov) studied the problems of teacher fatigue, in particular, the dynamics of their performance, conditions and mechanisms of professional maladaptation. Even then, it was discovered that fatigue occurs after 4 hours of work. Based on the data obtained A. Shafranov created a classification of professions (as cited in [16, pp. 57–64]:

- professions of the higher type based on the characteristic "the need for constant work on the subject and myself". This group includes the professions of the representatives of education, art, doctors, and engineers;
- middle-class professions that require work only on the subject;
- professions of the lower type, which after graduation do not require special work on themselves and the subject of activity.

The "higher professions" group peculiarities include the following characteristics: always a new work, a number of completely inaccessible to our observation moments, and the available moments require a special psychological analysis; in workers of mechanical labor, the properties of the product are determined by the tools of production, and here – the nature and properties of the personality of the employee (in our case – the properties of students are determined by the properties of the teacher). The need was determined through special training to develop to the perfection the ability because otherwise the violence against the psychic will be carried out and depression, irritability and fatigue will appear as a result. The fatigue was explained by "high volition of incentive participation", constant, active thinking work, complexity and variety of work.

Researches wrote about the occupational deformation of the teacher's personality, which causes huge stresses to the nervous system and the emotional sphere. Overload is often not realized by the teacher. Continuous creativity and extra-curricular work on yourself and the subject, constant "activation of volitional impulse", an incredible number of requirements, frequent nonspecific emotions – all this does not go without a trace. At the same time, teachers experience "mental fatigue", occupational maladaptation, and occupational deformities as they gain experience, develop their approach, work style, and professional position. The very same "pedagogical system, organized in the previous form", L. Vygotsky argued [17], "is a place for educating a teacher's abnormality and creating a teacher's neurosis" [17, p. 459]. The great danger, said L. Vygotsky, is that "the teacher begins to feel like an instrument of education, a gramophone that has no voice and sings what the plate suggests. It must be said that any teaching profession imposes indelible typical features on its medium and creates pathetic figures who act as apostles of the walking truth. No wonder the teacher, this lively precept, always seemed humorous figure, the subject of jokes and

ridicule and has always been a comic character, from ancient comedies to modern stories” [17, p. 459].

Analyzing the work of the teacher, M. Rubinshtein in his work “Problems of the teacher” emphasized that only an emotionally mature personality can overcome the difficulties of pedagogical activity. The scientist warned beginning teachers that emotionally, the teacher must improve himself to survive, to “keep himself alive in conditions where there is no cultural and professional support”, and not to degrade as a person. To do this, the teacher must develop to perfection their potential capabilities, natural inclinations, abilities, master the basics of science, to create their personality based on natural and cultural. The scientist noted that the teacher needs to develop the ability to “use another’s psyche, even reincarnate, but not dissolve in it”, “stand taller, but not put yourself above others” [18]. The terms “empathy”, “emotional burnout syndrome” were introduced into scientific circulation much later.

V. Kashkadamov’s ideas about researching the health of teachers and the factors of their professional activity were also interesting. He believed that health was a prerequisite for the teacher’s activity and self-realization. Teachers’ health can be ensured by observing the general order of life, which implies the organization of proper nutrition, living conditions, the content of the professional activity, nature of recreation, entertainment [19].

In 1928, when comprehensive studies of teachers were conducted, the study of professional difficulties began. The following groups of teachers’ difficulties were distinguished [20, p. 163]:

- high nervous and mental stress,
- children’s mass as a teacher irritator,
- tension of the “working” organs in the somatic sphere (upper respiratory tract, larynx, visual organs, hearing),
- sanitary and hygienic conditions,
- the mode of work,
- social and living conditions.

As we can see, life’s difficulties, in general, were considered, not just those which were related to the pedagogical activity, and difficulties that could affect the health of the teacher.

In the late 1920s, didascology was proclaimed the leader of bourgeois individualism, for a long time, proved undesirable. Modern scholars point out that the didascological approach gives an opportunity to influence teacher’s professional consciousness, behavior, health (analogy of modern supervision in pedagogical activity) in the process of individual work with the teacher in active forms.

At this time, studies of Russian psychoanalyst scientists were interesting. The representatives of psychoanalytic pedagogy in the sphere of the human personality improvement, first of all, dreamed about nurturing a happy person who would spend their mental energy not to fight internal conflicts but could direct them to creativity and personal happiness [21, p. 179]. The first teachers-psychoanalysts set themselves a “global” task of general

prevention of children and adolescents, sought to develop the socio-psychological competence of the teacher. Many educational theories and styles have been formally recognized as factors in the neurotic development of both children and educators due to the criticism of psychoanalyst educators. In the 1920s and 1930s, Russian psychoanalyst educators, in collaboration with psychologists from around the world, worked out the problems of education and harmonization of the human inner world. But the true goals of psychoanalysis were to help a person achieve personal happiness, harmony with others and himself – did not coincide with the goals of party leaders to educate a generation of obedient builders of communism, so the Russian unification was liquidated.

In Soviet times, the problem of the occupational deformation of the teacher was relatively “closed” for domestic scientists. Ideological paints were used to obscure the facts about the negative influence of the profession on the individual. It was considered that a specialist should not be emotionally exhausted at work, feel emotional discomfort when interacting with students, colleagues at work, while performing their functional duties, or talking about their professional incompetence, incapacity. Often, the problem of occupational deformation was associated with the non-professionalism, immorality of the personality of the teacher. Special studies on the negative impact of the profession on the health of the teacher in connection with the party-ideological line of leadership in science in the country have not been conducted for a long period, have been artificially removed from the range of current scientific problems.

In 1934 V. Zenkovskyi drew attention to the complexity of pedagogical activity: “The teacher constantly thinks not about himself but about the child. The teacher always gives, but never receives” [22, p. 58]. The author noted that in order for a teacher to understand children, he must “fall to their level”, and therefore “the teacher spontaneously does not go forward, but constantly falls to the level of his pupils in order to understand them and be clear” [22, p. 59]. Characterizing the specifics of pedagogical work and formulating his vision of the norm of the professional activity of the teacher, the scientist noted that it’s not necessary to work with the children more than 15 years because after that, in addition to fatigue, the immobility (conservatism) is produced, the desire to keep to the pattern, self-confidence. V. Zenkovsky wrote that “Teacher psychology is very complex and difficult, and if something keeps the teacher inside, it is only pedagogical idealism. Pedagogical idealism has a great healing influence on the teacher, freeing him from all extremes and temptations” [22, p. 60].

The problem of preserving the health of the teacher was reflected in the works of A. Makarenko and V. Sukhomlinskyi. A. Makarenko wrote in his “Reflections” a bitter truth, which still sounds like a terrible social diagnosis to the teachers. “The teachers, he said, ... have a miserable look. At best, these are the people who learned their subject till the very end, who are driven from school to school in the early morning to late evening to earn as much as possible. In other cases, and mostly, they are tor-



mented by poverty, impotence and family conditions, employees who are doing their jobs in the classroom, holding on to their place, more or less successfully avoiding dangerous quarrels and mockingbirds, who are not well-dressed and have a place to live. The teacher receives a salary almost the same as the pay of the city cleaner or janitor, but the janitor receives clothes, and the teacher receives nothing but 100-120 rubles. Naturally, this job is done by a person who is too weak to get any other job anymore” (Makarenko, as cited in [23, pp. 3-4]).

According to A. Makarenko, occupational deformations are manifested in the notations of teachers, in the severity, excessive “adult seriousness, artificially created by pedagogical gloom”. That is why irritability, harshness and harsh screams, which the pupils do not forgive the teacher for, are unacceptable – wrote the great teacher. A. Makarenko emphasized the inadmissibility of deformation of the pedagogical team, the reason for which is a halt in its development. He states that the teacher must be able to manage his mood, be able to play to keep his nerves: “The teacher can not play. There can be no teacher who cannot play. We cannot allow our nerves to be a pedagogical tool, we cannot accept that we can nurture our children with the help of our heartache, the torment of our soul. We are people. And if in any other specialty you can do without mental suffering, then we should do it. But sometimes the student has to demonstrate the torment of the soul, and to do so he must be able to play” [24, p. 142].

The manifestation of occupational deformation V. Sukhomlynskyi saw in the spiritual “ossification” of the teacher, indifference to the student, disbelief that the student can do something good, in reconciliation with the idea that the bad student should stay a bad one [25, p. 39]. A means of prevention of deformation, exhaustion, fatigue is a continuous improvement of a teacher’s professional potential. V. Sukhomlynskyi stated that “in three to five years after graduation, a teacher should know three, five, ten times more than he knew in the first year of his work. If this is not the case, the students will be doomed to boredom and dullness, because teaching, not warmed up and illuminated by the teacher’s desire for knowledge, becomes a heavy-duty for him, a burden, and the child reflects any desire for knowledge and destroys its intellectual makings and ability” [25, p. 51].

V. Sukhomlynskyi warned teachers against negative emotions and their effects on health. He noted: “Misery, anger, indignation – not only worsen unpleasant experiences in his soul but also worsen the work of the internal organs. ... An educator’s health disorder starts with the fact that it allows growing ill-health, which is a dangerous illness of the heart, which affects the heart and nerves”. Then the teacher becomes a “bilious, irritable, gloomy creature”, the work becomes hard labor for him and he “appears a hundred ulcers, a hundred vices” [26, pp. 425-432].

To preserve his health, V. Sukhomlynskyi advised to remember [27, p. 507]:

- love for children is the source from which new forces can be constantly drawn;

- optimism is an inexhaustible source of creative energy, the nerve forces of the teacher, the pupils, so the teacher must be able to “create in the music of childhood first of all light, life-giving tunes”, the health of the teacher, the strength of his spirit depend on;
- the ability to forgive students, other people – a prerequisite for maintaining occupational health. “The teacher must have a paternal and maternal apology to the child’s inability to control his will”;
- to be positive about others, towards yourself;
- the mutual benevolence of the teacher and the children are the finest threads that unite the heart and through which a person understands a person without words, feels the subtlest touches, disturbances of another person’s soul. In this mutual feeling of the heart, in the ability to read in the soul of man – an inexhaustible source of health;
- neurogenic disorders are often observed, among them the most unpleasant and often threatening is the exhaustion of nervous forces (the term “emotional burnout syndrome” in modern scientific literature) without the ability to “see and feel the world of childhood with its complex emotional harmony”;
- activation of creativity is a prerequisite for preservation, strengthening of the emotional health of the teacher. Creating the riches of his emotional sphere, the teacher protects himself from emotional elements – this is the condition that masks him during times of failure and frustration (this is a state of frustration in pedagogical activity);
- it is necessary to bring the flexibility of the nervous system to the degree of “the art of power over emotions”, to form emotional flexibility, to engage in self-education of feelings.

V. Sukhomlynskyi offers the teacher the means of relieving emotional tension, excitement and irritation, the means of promoting health. It is, first of all, the shifting of the energy of the whole team, including the teacher, into a work that requires spiritual unity, collective creativity, focus; secondly, it is humor without which a wall of mutual misunderstanding with the students arises; thirdly, the replenishment of nervous and spiritual forces, by the rational use of them in the process of daily work, as a very important guarantee of heart health and health of the spirit [26, pp. 425–429].

The analysis of psychological and pedagogical researches shows that the majority of scientific works of 1950-1970s years are devoted mainly to the formation of healthy lifestyles of children, adolescents, student youth. It is worth noting that at this time the most developed problem of forming a healthy lifestyle through physical culture and the science of health is emerging. First, it was called valeology and then – sanology. Subsequently, pedagogical valeology develops and pedagogical psycho-hygiene activities.

### **3.3 Development of the ideas for preserving and strengthening the professional health of teachers in the coordinates of psychology and pedagogy of health**

The beginning of the study of stress in the workplace was initiated by the American psychologists B. Margolis, W. Kroes, and R. Quinn, who in 1974 published the article "Occupational Stress: Unregistered Occupational Danger" [28]. In the 1980s, M. Litt and D. Turk even introduced the concept of "teacher stress" into scientific usage, which is interpreted as the experience of unpleasant emotions and physical pain that occurs when a teacher's well-being is threatened or when his ability to cope is exceeded urgent problems [29]. There are studies that present different models of occupational stress [30–32], occupational stress of teachers [33, 34].

The problem of mental burnout first appeared in the United States in the 1970s as a social problem rather than as a research construct. In the study's context of the negative impact of professional activity on the personality of the specialist, H. Freudenberger in 1974 introduced a special term "burnout". He interpreted this concept as a syndrome that contains symptoms of general physical fatigue and frustration in altruistic professions [35]. In 1978, the first article was published on the study of emotional burnout. Its authors, American scientists K. Maslach and S. Jackson [36], developed a multifactorial theory of burnout. They sought to find in the phenomenon of emotional burnout structure that would allow to make a deeper study and a quality diagnosis of its presence in specialists. Scientists interpret emotional burnout as a long-term response (reaction) of an employee to chronic interpersonal stressors at work. K. Maslach has the most famous description of emotional burnout: "Emotional burnout is a syndrome of emotional exhaustion, depersonalization and reduction of personal achievements, reduced personal accomplishment, which can occur among professionals engaged in various types of professions related to helping others" [37].

Some scholars do not limit the scope of emotional burnout to the professions of support and care. A. Pines and E. Aronson [38], for example, consider emotional burnout as a sign of fatigue that can occur in any profession, as well as outside of professional activities. According to A. Pines, burnout is a state of physical, emotional and mental exhaustion, which is caused by prolonged stay in emotionally stressful situations. According to him, burnout is the result of a failed search for meaning in life. The main cause of burnout is the need for people to believe in the importance and significance of their activities. Therefore, highly motivated individuals with inflated goals and expectations are most susceptible to burnout [39].

In the 1980s a constructive purposeful experimental study of burnout began. Various scientific ideas were supplemented by scientific research methods. As a result, many publications appeared and this problem began to be studied not only in the United States. Works [40–42] devoted to the problems of the emergence and prevention of professional burnout of teachers. To explain the phe-

nomenon of mental burnout, scientists identify three main approaches: an individual approach that focuses on the symptoms experienced by individuals who have experienced burnout; interpersonal approach, which emphasizes the importance of interpersonal relationships in the occurrence of burnout; organizational approach, which considers the organizational environment important for understanding burnout. However, research does not pay enough attention to the study of the relationship between the personal characteristics of the teacher and professional burnout and there is a lack of empirical evidence.

It should be noted that in the 1980-1990s, special publications began to appear on the problems of the negative influence of the profession on the personality of the teacher, occupational deformations, occupational burnout, which, as noted above, were "relatively closed" for Soviet scientists in the previous period. This was facilitated by the emergence of a new scientific direction – the psychology of health. The father of health psychology is the American scientist D. Matarazzo [43], who in the 1970s proposed the term "health psychology" to describe a fresh field of application of psychology. The term has gained general recognition in the world of psychological science. Subsequently, this scientific direction emerges in Soviet and Ukrainian psychological science. The goal of health psychology is not only to prevent the development of mental and somatic pathologies but also to preserve, strengthen and holistically develop the spiritual, social and somatic components of health. New "positive" concepts of psychological health, as noted by G. Nikiforov, predict tendencies for development, growth, self-realization, self-realization of a person, conscious ability to manage their actions, be responsible to themselves and others, have a developed system of values, ability to adequately perceive themselves and others [5].

At the same time, there were works that explored resilience as a quality of personality. It is worth noting that the concept of resilience was empirically discovered or even opened more than 40 years ago. The introduction of the term "resilience" to psychological scientific terminology is attributed to the early works of E. Werner and R. Smith [44]. Since then, the term has been used by theorists and practitioners in various related disciplines and researched by scientists. This concept implies the ability to maintain resilience to external and internal threats without losing the pace of development [45]. A little later, there are works in which resilience is seen as a dynamic process that involves positive adaptation in the context of significant problems. S. Hobfoll, N. Stevens, and A. Zalta [46] interpret resilience as the ability to resist stressors and "return to one's pre-stress state when the stressor is over", demonstrating coping strategies. Strategically, coping strategies are part of achieving resilience. D. Fletcher, M. Sarkar [45] distinguish these concepts and believe that resilience affects how an event is evaluated, while coping refers to strategies that work after evaluating an encounter with a stressor. These studies have influenced the development of technologies of socio-psychological resilience to overcome the negative consequences of exposure to adverse circumstances and occupational difficulties, preven-

tion of destructive behavior, ensuring the quality of further life and professional activities.

The end of the XX century is determined by a significant number of studies on resilience. It was during this period that researchers began to develop a variety of psychotechnologies for the prevention and development of resilience [47, 48]. These technologies are not yet very actively implemented in the work to ensure the professional health of teachers.

Modern scientists approach the study of this phenomenon comprehensively. Thus, a follower of the constructivist approach to the study of resilience, D. Hellenstein, conceptualizing this phenomenon, identifies two main components – physical resilience as an indicator of stress and tolerance and psychological resilience, which includes the development and maintenance of social contacts, the use of social support in difficult events or situations, raising the level of education and mastering various psychotechnologies that help to develop and overcome the negative effects of stress [49].

At the end of the XX century, science revived research on the problem of orthobiosis of the individual, which means a person's mental health, a healthy lifestyle. A healthy, sensible way of life is a self-organization of an individual's life on the principles of ecology, optimism and positive activity [50, p. 93]. This led to the appearance of works in which measures were proposed to preserve the mental health of the teacher, to improve his psychological well-being.

In the modern psychological and pedagogical literature, a great deal of research is devoted to the study of the essential aspects, factors of occurrence of occupational stress, syndrome of "occupational burnout" of teachers [4, 51, 52]; the formation of healthy lifestyles, valeological literacy, valeological consciousness, valeological culture of future teachers [2, 3, 53]. Recently, there have been a number of works that address the issues of prevention of the syndrome of "occupational burnout" of teachers, occupational stress [54, 55], preparation of future teachers for health-creative activity [52, 56].

Today an interdisciplinary branch of knowledge and practical activity is developing, which solves the problem of preserving and strengthening the psychological health of students and the occupational health of teachers – pedagogical health psychology. Much more attention is needed to research the diagnosis of occupational health, the development of preventive measures and ways to preserve and strengthen the occupational health of the teacher, formulate an optimal health strategy, increase the level of stress of the teacher, justify methods of harmonizing his inner world.

The Concept of Development of Teacher Education [57] emphasizes the personal and professional growth of the teacher, his academic freedom, motivation, the need to develop the teacher's health-saving competence. The health of the teacher is determined by the necessary prerequisite for the competent performance of his / her functional duties and at the same time an important component of his / her professional suitability.

The practice of conducting anti-burnout trainings, anti-stress trainings, self-efficacy trainings, personal and professional growth trainings is becoming widespread. This is especially observed in the system of postgraduate pedagogical education. Similar activities are carried out at the national level by the Academy of Innovative Development of Education with the support of the Ministry of Education of Ukraine in the framework of the scientific and pedagogical project "Training of management, pedagogical and scientific-pedagogical staff to work on innovative technologies". In this context, research is of interest in the development of stress resistance of specialists [54]; anti-burnout training [52]; training programs to increase the level of professional stress resistance of special teachers [55, 58, 59]. The main focus is on the development of psychological and pedagogical means of activating the personal resources of the teacher [60], which will contribute to the preservation and enhancement of his/her occupational health.

## 4 Discussion and conclusions

Maintaining and strengthening the teachers' professional health has always been and remains to be an urgent problem of pedagogical and psychological science. Therefore, it is important to trace the state of development and genesis of this problem's research in the history of scientific thought and the practice and to identify positive ideas for their creative use in modern conditions.

The study attempted to analyze the problem of teachers' professional health maintaining and strengthening in the retrospective. The analysis shows the issues that outline this problem have were not studied separately but in the context of maintaining and strengthening human health in general. Thinkers and researchers of different times have focused their research mainly on the formation of a culture of health, a healthy lifestyle, including and teacher. In the professional sphere, these problems have been studied in the context of the scientific organization of labor, optimization of management and safety of production, increasing vital energy, the impact on the performance of occupational fatigue, etc. A retrospective analysis revealed that research on the analysis of the professional health of teachers is relevant in the early twentieth century and is associated primarily with the study of emotional overload of teachers, occupational fatigue, related problems of occupational deformities of the teacher, and so on. These issues were considered mainly in the field of valeology, sanology, pedagogical psychohygiene, and since the end of the XX century – and health psychology, pedagogical psychology of health.

The study traces the genesis and characterizes the periods of studying the problem of preserving and strengthening the teachers' professional health, areas of research in the history of scientific thought (early XX century – early XXI century).

Based on the results of the study, such periods are singled out in the study of the problem of preserving and promoting the occupational health of the teacher:



- 1) 1900-1920s characterized by the emergence of the movement for the scientific organization of work, the development of issues of ensuring the health of workers. US scientists investigated the problems of work organization optimization, production safety, improving working capacity, overcoming occupational fatigue. This period is characterized by considerable experience of pedagogical education in Russia, in particular, the Commission for the Study of Teacher Labor on the study of the conditions and mechanisms of the emergence of occupational maladaptation, occupational deformations, finding out occupational difficulties, their impact on the health of the teacher. The results of these studies are relevant today. The pedagogical direction – didascology as a complex science about the teacher is presented. It is proposed to create an independent didascological institute. Complex researches of teachers are carried out. Such research is very necessary today. In the context of this problem, the research of psychoanalyst educators of the time, due to which many educational theories and styles had been formally recognized as factors of neurotic development of both children and educators, deserves attention.
- 2) 1930-1950s. In Soviet times, the problem of the occupational deformation of the teacher was relatively “closed” for domestic scientists. Ideological paints obscured the facts of the negative impact of the profession on the individual. Special studies in the field of the negative influence of the profession on health of the teacher in connection with the party-ideological line of leadership of science in the country were not conducted and artificially removed from the spectrum of important scientific problems. The views of A. Makarenko and V. Sukhomlinsky about the reasons for the teacher’s health deterioration, the ways and means of relieving emotional stress, and improving his psychological well-being are extremely relevant today.
- 3) 1960-1980s. Most scientific works of this period are devoted mainly to the formation of healthy lifestyles of children, adolescents, student youth. It is worth noting that at this time the most developed problem of forming a healthy lifestyle through physical culture and the science of health were emerging. First, it was called valeology and then – sanology. Subsequently, pedagogical valeology and pedagogical psycho-hygiene activities developed. 1970-1980s formed a new scientific direction – the psychology of health. The goal of this area is not only to prevent the development of mental and somatic pathologies but also to preserve, strengthen the holistic development of the mental, social and somatic components of health.
- 4) 1990s and the beginning of the XXI century. Scientific works of scientists of this period are devoted to the problems of formation of valeological consciousness, valeological culture, healthy way of life, culture of health of teachers, preparation of future teachers for health-creative activity. Studies on health psychology are being conducted. There is an active interdis-

ciplinary branch of knowledge and practical activity that explores the problems of preserving and strengthening the psychological health of students and the occupational health of teachers – pedagogical health psychology. In the system of postgraduate pedagogical education, the practice of conducting anti-burn training, anti-stress training, self-efficacy training, personal and professional growth training aimed at activating the teacher’s resources, developing his autopsychological competence, an increase of the level of resilience, harmonization of the person that will promote preservation and strengthening of occupational health.

Practically oriented directions of the professional health preservation and strengthening problem research, which is connected with the development of preventive measures and ways of preservation and strengthening of teachers’ professional health (including in the conditions of quarantine caused by coronavirus infection [61–63]); increasing the level of stress resistance of teachers and the development of their resilience; prevention of professional deformations; formation of readiness for self-rehabilitation. The issues of purposeful preparation of future teachers for maintaining and strengthening professional health at the stage of higher education are important.

We see the prospects of our further scientific research in the problem’s study of stress resistance and resilience of teachers at the stage of training in higher education and the system of formal and informal pedagogical education, and in developing ways to implement research results in practice, in particular, in the centres of pedagogical consulting.

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## Secondary education reform priorities under globalisation: the case of Ukraine in comparison with China, Germany and Poland

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**Abstract.** The paper presents the analysis of the secondary education reform priorities in Ukraine in comparison with China, Germany and Poland under globalization. The following research questions were asked: (1) What are the education development benchmarks at the global and European levels? (2) What are the common characteristics of the reforms that countries are implementing guided by global and European benchmarks? (3) Is secondary education reform in Ukraine harmonized with the reforms implementing worldwide? The desk research was used. This manuscript targets the international (UN, EU) and national institutional plans/strategies/movements that have attempted to bring or are bringing systemic change into educational practices (curriculum reforms and operational structures). The study confirms the methodological proposition that globalization changes the very format of educational policy development – the national level is complemented by the supranational level in the face of international organizations. A comparative analysis of the education reforms directions in the analysed countries showed that the countries takes into account the key benchmarks of the international organizations, i.e. ensuring equal access to education and improving its quality. In Ukraine, the new legislation guarantees the enrolment in primary school without a competition; territorial accessibility of general secondary education; financing of educational institutions at the expense of state and local budgets in the amount sufficient to meet state standards; compliance with the requirements of the legislation on the accessibility of educational institutions for persons with special educational needs. The transformation of the content of education into competence bases is another important component of the current Ukrainian secondary education reform. It involves the change of the traditional philosophy – from the transfer of knowledge to the formation of students' vital/key skills/competences (interdisciplinary, transversal competences, ICT skills, learning to learn, working with information, teamwork skills, participation in society, moral values, etc.). It is stated that Ukraine is to continue the reforms in order to further harmonise its education with the European and world education developments.

### 1 Introduction

Since independence declaration in 1991, Ukraine has been implementing the reforms of education to integrate it into the European and world educational areas. Integration envisages synchronizing the key parameters of the national education with the international standards. Understanding the global trends in education is important in this context. Therefore, comparative studies are becoming relevant.

### 2 Literature review

The topic of the reforms in education is of great interest for the Ukrainian comparative education scholars in view of the reform of the national education. The following conclusions made by the comparative educators are important for our paper:

- Reforms of the end of the 20th – the beginning of the 21st century ... primarily aimed at achieving higher quality performance of educational systems. However, the most important conditions for the effective im-

plementation of the market-oriented reforms are: ensuring equal rights of citizens to quality education through thorough development of the legal framework for market-oriented reforms; ensuring a real opportunity for educational choice by eliminating the possibility of discrimination by educational providers; introduction of programs of positive discrimination of education in economic and socially neglected regions, in areas inhabited by ethnic minorities in order to increase the level of social justice in education [1].

- Education reforms in the EU countries are aimed at improving quality and at the democratization of education systems towards overcoming dualism and selectivity in it [2].
- A reform is to be conceptually, organizationally, financially secure and staffed established in combination with a positive attitude towards it. Sustainability of a reform is another characteristic of its efficiency – availability of a clear reform concept and the commitment of the authorities is an important requirement, so that with each change of power, new reforms do not begin from scratch [3].

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The comparative studies are the subject of analysis by many foreign scholars. In the context of globalization, much attention is paid to the research of global and regional trends in education. In particular, Mok emphasizes the actualization of the aspect of education quality in the East Asian countries/economies (China, Hong Kong, Japan, South Korea, Taiwan and Singapore) under the influence of globalization (marketization, privatization, governance changes, managerialism, economic rationalism and neo-liberalism) [4].

Revealing the nature of the reforms in education in Europe over 100 years, Garrouste writes about the constant search for a balance between equality (institutionalisation of pre-primary education programmes and increasing the pre-school institutions provision; extension of the duration of compulsory schooling; prioritization of minority access to education) and quality (introduction of the national monitoring systems and standardized assessment of students performance) [5].

Research on educational transformations at the cross-cultural and transnational levels focuses primarily on the economically developed countries of the world. Gruijters, Chan & Ermisch study the problem of educational opportunities in China in comparison with Germany, the Netherlands, UK and the USA. Studying the aspect of educational mobility according to a number of dimensions: (a) horizontal differentiation; (b) centralization of funding and resources; (c) standardization of curricula and tests; and (d) marketing the scholars underline the challenge of the growth of inequality in educational opportunities under globalization [6].

Thus, the findings of the Ukrainian and foreign comparative researchers testify that globalization exacerbates the challenges of social equality and, at the same time, actualizes the priority of economic efficiency. It directs educational reforms in the world to such key issues as equality and quality of education.

This paper is a logical continuation of the study of transformations in education under globalization, the results of which are presented by the authors in collaboration with other researchers of the Department of Comparative Education of the Institute of Pedagogy of NAES of Ukraine in the collective monograph "Transformation processes in school education in the countries of the European Union and in USA". Among other things, the authors concluded that transformations are characterized by multidimensionality today, i.e. in parallel with the curriculum reforms countries continue to extend the duration of schooling by raising the age of completion of compulsory education, or /and by reducing the age of enrolment of children in primary school [7].

### **3 Research methodology**

#### **3.1 Concepts underlying the research**

Based on the definitions provided by the dictionaries we understand the education reform as an improvement or change for the better in the education sector [8].

In the article, we understand globalization as the increased interconnectedness and interdependence of peoples and countries: the opening of international borders to increasingly fast flows of goods, services, finance, people and ideas; and the changes in institutions and policies at national and international levels that facilitate or promote such flows [9].

The objective of this paper is to conduct the comparative analysis of the secondary education reform priorities in Ukraine and in the countries of the world. To do this, the following research questions were asked:

1. What are the education development benchmarks at the global and European levels?
2. What are the common characteristics of the reforms that countries are implementing guided by global and European benchmarks?
3. Is secondary education reform in Ukraine harmonized with the reforms implementing worldwide?

Secondary education in our research corresponds to the ISCED 1, 2 and 3 levels of the International Standard Classification of Education [10].

The presentation of the material of the paper corresponds to the logic of research questions. At the beginning, an overview of the education strategic benchmarks of international organizations is made. Then the common directions of secondary education reform for all countries are analysed. The study concludes with an understanding of secondary education reform in Ukraine through the prism of reforms in foreign countries.

The following countries were selected for the comparison: the People's Republic of China, the Federal Republic of Germany, and the Republic of Poland. China was selected for the analysis as a leading country in the global space. The success of the secondary education reforms in China is reflected by the results of China in PISA 2018, in which students from Beijing, Shanghai, Jiangsu, Zhejiang (China) ranked No. 1 among other countries. These successes are becoming more significant given that half a century ago the share of illiterate people in China reached 80%. In less than 20 years, the country has made an incredible leap and travelled a path in which other countries have spent much more time. China is developing its national education under the influence of socialist ideas. Therefore, the experience of this country is of interest to Ukraine, which has a socialist past.

An analysis of education reforms in the EU is important for Ukraine in the context of its political course towards European integration. In view of this, the following European countries were selected for the analysis: Germany – as one of the leading countries in Europe and Poland – as the EU Member State, Ukraine's neighbour and a country with a common socialist past. Moreover, according to OECD Polish schoolchildren are the third best in Europe at maths and science, and the fourth best at reading comprehension, according to the PISA 2018 international rankings. The 2018 PISA study shows that German schoolchildren are performing at above-average levels [11].

In the collection of data the desk research (analysis of international/national documents available on the official web-sites) was used, with the focus on the secondary education sector. This manuscript targets the international and national institutional plans/strategies/movements that have attempted to bring or are bringing systemic change into educational practices (curriculum reforms and operational structures).

The documents of the international agencies – OECD, UNESCO – were used to study the processes and reforms in education taking place at the global level. The EU documents and the EURYDICE resource were used to get data/information on the education developments at the European level.

To understand the directions of school education reforms in the analysed countries, the official documents defining educational policy were studied. In particular, the Outline of China's National Plan for Medium and Long-term Education Reform and Development (2010–2020) was analysed to understand the directions of school education reforms in China [12].

The document of the Secretariat of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder (Ständige Konferenz der Kultusminister der Länder, KMK) in the Federal Republic of Germany "The Education System in the Federal Republic of Germany 2016/2017" was a reference point for the analysis of the reforms in Germany [13].

The analysis of the reforms in Poland based on the Responsible Development Strategy for the period up to 2020 (including the perspective up to 2030) [14] and Lifelong Learning Perspective [15].

The analysis of the benchmarks of the reforms in Ukraine was conducted on the basis of the Laws of Ukraine "On Education", "On Complete General Secondary Education", the Government Concept "New Ukrainian School" [16–18].

A comparative method was used to understand the nature of the reforms in the selected countries.

### 3.2 Challenges and limitations of the research

There have been challenges due to the reason of different geographical location of the countries (Asia/Europe), their size and political systems. Besides, there were the following methodological difficulties: centralized vs decentralized education systems; various formats of the strategic documents. The limitations of the research include: the consideration of the directions of reforms at the level of strategic / legislative documents; the analysis of the quality education reform only from the standpoint of the formation of basic skills / key competencies.

## 4 Research results

### 4.1 Key objectives of education development at the global and the European levels

Traditionally, a state determined the directions of education development forming the vision of the model of the

citizens' training for professional activity and coexistence in the community. In the context of globalization transformation of the format of the national educational policies development takes place. International organizations – "agencies set up by two or more states to carry out projects and plans in common interest" (UN, UNESCO, OECD, World Bank, EU, and Council of Europe) – begin to play a key role [19].

The Incheon Declaration "Education 2030: Towards inclusive and equitable quality education and lifelong learning for all" is the global education agenda that has been articulated by UNESCO, UNICEF, the World Bank, UNFPA, UNDP, UN Women and UNHCR within the implementation of Sustainable Development Goal 4 of the worldwide movement for Education for All [20].

The document proclaims the overarching goal of the education development till 2030, i.e. "to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". The Declaration encourages countries and the global community to focus efforts on access, equity and inclusion, quality and learning outcomes, within a lifelong learning perspective.

The "Europe 2020 Strategy" sets an objective to raise the quality of education for the purpose of smart, sustainable and inclusive growth in order to improve Europe's competitiveness and productivity [21].

The Strategic Framework for European Cooperation in Education and Training "Education and Training 2020" shapes the education policies in its Member States. The Strategy pursues the following four objectives:

- Make lifelong learning and mobility a reality;
- Improve the quality and efficiency of education and training;
- Promote equity, social cohesion, and active citizenship;
- Enhance creativity and innovation, including entrepreneurship, at all levels of education and training [22].

It supports the achievement of the following benchmarks at the European level by 2020:

- at least 95% of children should participate in early childhood education;
- fewer than 15% of 15-year-olds should be under-skilled in reading, mathematics and science;
- the rate of early leavers from education and training aged 18-24 should be below 10%;
- at least 40% of people aged 30-34 should have completed some form of higher education;
- at least 15% of adults should participate in learning;
- at least 20% of higher education graduates and 6% of 18–34 year-olds with an initial vocational qualification should have spent some time studying or training abroad;
- the share of employed graduates (aged 20-34 with at least upper secondary education attainment and having left education 1–3 years ago) should be at least 82% [23].



**Table 1.** Priorities of the Incheon Declaration to be focused while achieving the overarching goal of the education development till 2030

Priority	Content
Access	Ensure access to and completion of quality education for all children and youth to at least 12 years of free, publicly funded, inclusive and equitable quality primary and secondary education, of which at least 9 years are compulsory, as well as access to quality education for out-of-school children and youth through a range of modalities. Ensure the provision of learning opportunities so that all youth and adults acquire functional literacy and numeracy and so as to foster their full participation as active citizens. The provision of at least 1 year of free and compulsory pre-primary education of good quality should also be encouraged.
Equity and inclusion	Ensure equity and inclusion in and through education and address all forms of exclusion and marginalization, disparity, vulnerability and inequality in education access, participation, retention and completion and in learning outcomes. As gender equality is another key feature of SDG4-Education 2030, this agenda pays particular attention to gender-based discrimination as well as to vulnerable groups, and to ensuring that no one is left behind.
Quality	An integral part of the right to education is ensuring that education is of sufficient quality to lead to relevant, equitable and effective learning outcomes at all levels and in all settings. Quality education necessitates, at a minimum, that learners develop foundational literacy and numeracy skills as building blocks for further learning, as well as higher-order skills. This requires relevant teaching and learning methods and content that meet the needs of all learners, taught by well-qualified, trained, adequately remunerated and motivated teachers, using appropriate pedagogical approaches and supported by appropriate information and communication technology (ICT), as well as the creation of safe, healthy, gender-responsive, inclusive and adequately resourced environments that facilitate learning.
Lifelong learning	The right to education begins at birth and continues throughout life; therefore, the concept of lifelong learning guides SDG4-Education 2030. To complement and supplement formal schooling, broad and flexible lifelong learning opportunities should be provided through non-formal pathways with adequate resources and mechanisms and through stimulating informal learning, including through use of ICT.

Thus, the international organizations form strategy for education development at the global / regional levels. As can be seen from the above documents, equal access and quality of education are the benchmarks for countries to develop their national education systems under globalization.

#### 4.2 Countries' common reforms initiatives under global and European benchmarks

The comparative analysis of the secondary education reform strategies in China, Germany, Poland and Ukraine made it possible to articulate the common initiatives under equal access and quality education benchmarks.

*Equal access to education.* In China, the goal of ensuring equal access to education is identified as a priority in the "National Plan for Medium- and Long-Term Education Reform and Development: 2020", issued in 2010 "Education should remain public welfare-oriented in nature, and equal access to it shall be safeguarded" [12].

It is expected to be achieved by:

- Popularizing nine-year compulsory education;
- Making a norm of senior middle school education, with a 90% gross enrolment rate;
- Providing equal services to urban and rural areas;
- Narrowing down are regional disparities in the access to education;

- Providing equal compulsory education opportunities for children of migrants;
- Guaranteeing disabled people's right to education.

In order to increase the secondary education coverage, the authorities replaced the junior secondary school entrance examination with a policy of mandatory enrolment based on the area of residence. In order to narrow the rural-urban gap and regional differences in education, target programs are being introduced to improve the infrastructure for schools in rural areas [24].

In Poland within the Acts "Law on School Education" and an Act "Legislation introducing the Act – Law on School Education" structural reform of the secondary education is being implemented since 2017. The reform envisages provision of all pupils of the appropriate ages a solid background of general education required for further personal development and the needs of contemporary labour market. The reform envisages transformation of the two-stage general full time compulsory education (6-year primary school + 3-year lower secondary school) into one stage general full time compulsory education (8-year single structure called primary school).

Besides, an obligatory one year of pre-primary education for 6-year-olds is introduced within the structural reform. It is done in order to master basic skills by children before they start school [25].

In terms of enhancing the equal access to education the reform foresees provision of textbooks free of charge

and extension of secondary programmes – both general and vocational – by one year (4-year general and 5-year technical upper-secondary school) [25].

Under decentralized education in Germany each Land pursues its education policy. Together, all 16 Länder and the Federal Government implement education policy aimed at further development of the national education. The KMK is responsible for coordination and harmonization of the education policy development at the national level [13].

Following the results demonstrated by the German students in PISA 2000, Germany is constantly focusing on equalizing access to education. In the context of modern reforms, special attention, as in all EU countries and many countries around the world, Germany focuses on the maximum coverage of children of appropriate age by the provisions of early childhood education and care (ECEC). The Childcare Funding Act guarantees providing financial support to the Länder to expand ECEC provision. With the Good Daycare Facilities Act (Gute-KiTa-Gesetz), the focus is shifting towards improving equity and quality. According to the OECD evidence participation in ECEC is high in Germany, i.e. at 95% [26].

Besides, the Federal Government in cooperation with the Länder focuses on the following measures:

- Strengthening the link between the ECEC sector and primary school with the aim of an early school entry;
- Support for the Länder in their investments in all-day schooling and care services;
- Integration of children and youths from migrant backgrounds into the school system.

The digitalization of education is an important modern German initiative in the context of equalization of learning opportunities. This reform is comprehensive. With the Digital Pact for Schools, Germany aims to improve the digital infrastructure of schools, develop pedagogical content to equip children with ICT skills, and improve teachers' competencies.

It is planned to allocate 5 billion euros from the federal budget for the introduction of digital technologies in German schools, at least 10% of the amount Länder are to spend on digital equipment in schools. While the Federal Government will provide better equipment with digital technology, the Länder will train teachers so that they can make good didactic use of digital media and impart digital skills.

In Ukraine, everyone's right to education is guaranteed by Article 53 of the Constitution of Ukraine [27].

At the same time in the document of the Ministry of Education and Science of Ukraine "New Ukrainian School: Conceptual Principles of Secondary School Reform" it is written about the existence of the problem of unequal access to education. Inequality is seen primarily in terms of equitable funding for providing quality education in urban and rural areas /state and private schools, etc. [18].

"The Concept of Implementation of the State Policy in the Field of Reforming General Secondary Education

"New Ukrainian School" for the period up to 2029", approved by the Order of the Cabinet of Ministers of Ukraine of December 14, 2016 No. 988-r, is aimed at solving this problem as well [28].

The concept provides:

- Improving the formula for calculating the education subvention to ensure equal access to quality education in different regions and settlements;
- Introducing equal access to budget funding for schools, regardless of ownership.

In addition, in order to equalize opportunities for each child, there are:

- To open 200-250 hub schools in rural areas;
- Create a national e-platform for e-courses and textbooks, develop e-textbooks, distance learning courses on curricula, distance learning system for teacher training.

Further development of equal access to education is made in the Law of Ukraine "On Complete General Secondary Education" [17].

Article 9 of the Law guarantees equal access to secondary education in terms of enrolment into primary school without a competition, territorial accessibility of general secondary education institutions; financing of educational institutions at the expense of the state and local budgets in sufficient amount; accessibility of educational institutions for people with special educational needs [17].

Thus, access reforms are a priority of educational policy in the analysed countries. The common benchmarks of these reforms include the creation of opportunities for maximum participation of school-age children in education, regardless of gender, race, social origin, place of residence. To this end, countries implement measures such as narrowing the rural-urban gap and regional differences in education (China, Ukraine); replacement of the junior secondary school entrance examination (China); support for the Länder in their investments in all-day schooling and care services (Germany); providing equal education opportunities for children of migrants (China) / integration of children and youths from migrant backgrounds into the school system (Germany); introduction of the obligatory one year of pre-primary education for 6-year-olds (Poland); provision of textbooks free of charge (Poland) / development of national e-platform for placement of electronic courses and textbooks (Ukraine).

*Quality of education.* "An integral part of right to education is ensuring that education is of sufficient quality to lead to relevant, equitable and effective learning outcomes at all levels and in all settings. Quality education necessitates, at a minimum, that learners develop foundational literacy and numeracy skills as building blocks for further learning, as well as higher-order skills" – is stated in the Incheon Declaration [20].

The EU has chosen a competency approach. "Fostering the development of competences is one of the aims of the vision towards a European Education Area that would be able to harness the full potential of education and culture as drivers for jobs, social fairness, active citizenship as

well as means to experience European identity in all its diversity”, stated in the Council Recommendation of 22 May 2018 on key competences for lifelong learning. The Recommendation provides a common European Reference Framework for the Member States identifying the following renewed list of eight key competences: literacy, multilingualism, numerical, scientific and engineering skills, digital and technology-based competences, interpersonal skills, and the ability to adopt new competences, active citizenship, entrepreneurship; cultural awareness and expression [29].

In order to develop skills / competencies, countries transform the curriculum, reform both the approaches to the design of the curriculum structure (introduce the results-oriented standards) and update its content.

Conceptual guidelines of the secondary education content in China were defined in the Ministry of Education Outline of the Reform of Basic Education Curriculum. The Outline defines the following objectives for curriculum reform:

- Change from a narrow perspective of knowledge transmission in classroom instruction to a perspective concerned with learning how to learn and developing positive attitudes.
- Change from a subject-centred curriculum structure to a balanced, integrated and selective curriculum structure to meet the diverse needs of schools and students.
- Change from partly out-of-date and extremely abstruse curriculum content to essential knowledge and skills in relation to students’ lifelong learning.
- Change from a passive-learning and rote-learning style to an active, problem-solving learning style to improve students’ overall abilities to process information, acquire knowledge, solve problems and learn cooperatively.
- Change the function of curriculum evaluation from narrowly summative assessment (e.g. examinations for the certificate of levels of achievement and for selection) to more formative purposes such as the promotion of student growth, teacher development and instructional improvement as additional functions.
- Change from centralised curriculum control to a joint effort between the central government, local authorities and schools to make the curriculum more relevant to local situations [30].

China’s Strategic Documents defining education development benchmarks as National Plan for Medium- and Long-Term Education Reform and Development: 2020 and Guidelines on Deepening the Education Reform and Teaching to Improve the Quality of Compulsory Education [31] further develop the concept of the curriculum defined in the Outline of the Reform of Basic Education Curriculum.

In Germany in 2003 and 2004 Kultusministerkonferenz (KMK) issued a set of educational standards for primary and early secondary education applicable to all of the country’s 16 states. In June 2015, the KMK issued the “Recommendations on the work in the primary

school” [32] aimed at mastering basic competences (reading and writing as well as mathematics) by primary school children. These competences are viewed as a basis for not only all other educational areas in the primary school but also for continuing education.

Strengthening language competences is another area of the reform of the secondary school. In 2019, the Standing Conference adopted a joint recommendation “Strengthening educational language skills in the German language” [33] that provides the Länder with an orientation framework. To this end, the Länder have agreed on 10 principles which form the basis for strengthening educational language competences in the German language.

The focus on digital skills is another priority of Germany’s educational policy in the area of competence education. In 2019, in order to intensify the acquisition of digital skills by young Germans, the Bundesrat approved the DigitalPact for Schools 2019–2024 [34]. Its overall goal is for pupils to be able to use a digital learning environment in all subjects and learning areas in order to acquire the necessary skills in the digital world.

The Responsible Development Strategy for the period up to 2020 (including the perspective up to 2030) of the Republic of Poland identified human and social capital as areas of major importance for the implementation of a new model of country development – a responsible and also socially and territorially sustainable development [14].

In the Strategy the special attention is paid at skills/competences/ qualifications of the Polish population. In particular, on:

- Transversal skills, which allow playing social and professional roles/functions in different contexts;
- Digital skills, which are indispensable for functioning in the contemporary world;
- Professional skills, as the shortage of skilled workers can prevent or hinder the development of vital sectors listed in the Strategy [35].

Specific directions of reforms in education and tools for their implementation are identified in the Lifelong Learning Perspective [15].

The document announced the introduction of a new curriculum format, i.e. curriculum based on learning outcomes [36].

The new core curriculum (laid down by the Regulation of the Minister of National Education of 14 February 2017) outlines the learning outcomes that should be achieved at the end of each stage of education. Instead of knowledge transferring the new curriculum focuses on the following key skills:

- Efficient communication in the Polish language and modern foreign languages;
- Efficient use of mathematical tools in everyday life, and mathematical thinking;
- Searching, sorting out, and critical analysis and use of information from various sources;
- Creative solving of problems in various areas while using purposefully ICT-based methods and tools, including programming;



- Solving problems, also with the use of mediation techniques;
- Team work and societal engagement;
- Active participation in the cultural life of the school, local community and country [36].

In Ukraine, the transformation of the content of education into competence bases is an important component of the current secondary education reform. The competence education is substantiated in the “New Ukrainian school. Conceptual Principles of Secondary School Reform”. It states that the “formula of a new school consists, among other things, of a new content of education, which is based on the formation of competencies necessary for successful self-realization in society” [18].

The Law of Ukraine “On Education” approved the following list of key competencies that school graduates should master: fluency in the state language; ability to communicate in mother tongue (in case it differs from the state language) and foreign languages; mathematical competence; competence in the area of natural sciences, engineering and technology; innovation; ecological competence; information and communication competence; lifelong learning; civic and social competences related to the ideas of democracy, justice, equality, human rights, well-being and a healthy lifestyle, with the awareness of equal rights and opportunities; entrepreneurship and financial literacy; cultural competence [16].

Thus, the formation of key competencies / basic skills of young citizens is a task of secondary education in all countries. To do this, they implement a comprehensive content reform. It involves the transformation of its philosophy – from the transfer of knowledge to the formation of students’ vital skills (interdisciplinary, transversal competences, ICT skills, learning to learn, working with information, teamwork skills, participation in society, moral values, etc.). It is obvious that there are national differences in the implementation of such a reform, i.e. from focusing on the formation of the full range of skills / competencies to the prioritization of some of them, primarily, functional literacy, digital skills.

## 5 Discussion

The study confirms the methodological proposition that globalization changes the very format of educational policy development – the national level is complemented by the supranational level in the face of international organizations. Verger, Novelli and Altinyelken writes that globalization revitalizes the role of international agencies in making educational policy. Among them, international governmental organizations with an explicit or implicit education mandate, such as the World Bank, OECD or UNESCO, stand out. . . International players have an increasing capacity to settle education agendas and define the priorities of countries concerning education reform processes, but also to impose certain policies via funding mechanisms and aid conditionality [37].

The influence of the Strategic Framework for European Cooperation in Education and Training “Education

and Training 2020” is obvious on the example of Germany and Poland. Under EU legislation, secondary education is the prerogative of the Member States. At the same time, with the introduction of the Open Method of Coordination (OMC) (extended to education by the Lisbon Treaty in 2000) there is a gradual harmonization of education in the Member States. Humburg states that the OMC does not foresee the production of binding rules and does not force Member States to implement any measures, however, the European Commission possesses a fairly high degree of informal agenda setting power with regard to shaping the instruments of the OMC, namely common objectives, guidelines and benchmarks [38].

A comparative analysis of education reforms directions in the analysed countries showed that the countries takes into account the key benchmarks of the international organizations, i.e. ensuring equal access to education and improving its quality.

Summarizing the positions of international organizations and the experience of countries in implementing the concept of equality in education, Levin writes about two axes or dimensions around equity. One dimension deals with whether overall levels of provision are sufficient and of the right kind. The second dimension of equity concerns the participation, primarily of particular groups (ethnic minorities, disadvantaged segments of a society, women) [39].

It is obvious that the concept of “equality in education” is implemented by countries in the context of national priorities. Hippe, Araújo and Dinis da Costa, analysing the situation with equal access to education on the example of Europe, emphasize that “one size fits all” policies do not appropriately address the needs of diverse learners in different countries. Policies have to be tailored to specific contexts and populations. Just importing policies from other countries without further analysis may not work – the particular local contexts and stakeholders have always to be taken into account [40].

Differences in the implementation of the equal access to education reform are observed not only between countries, but also within a country. The example of Germany is obvious, where the key agents of reform are the Länder. In particular, the Federal Childcare Funding Act guarantees financial support to the Länder to expand ECEC provision. At the same time, each Land implements the Act provisions differently. Several federal states (Berlin, Brandenburg, Mecklenburg-West Pomerania, Lower Saxony and Rhineland-Palatinate) have entirely or partly abolished ECEC tuition fees; some Länder have established one-year pre-school programmes, under various names, for children who have reached compulsory schooling age, but whose level of development does not yet allow them to cope with the challenges of primary school.

The common characteristics of equality reform in the analysed countries include: overall accessibility and affordability of ECEC; universalized secondary education; low level of school failure and dropout; avoiding early tracking; equal opportunities for urban and rural areas and for men and women; special attention for target groups (persons with special needs, migrants, etc.).

The concept of quality is no less multidimensional. At the same time, key skills are considered by the world community as a key indicator of quality education. For example, the UNESCO concept of quality education focuses on literacy, numeracy and life skills, and is linked directly to such critical components as teachers, content, methodologies, curriculum, examination systems, policy, planning and management and administration [41]. The level of functional literacy by 15-year-old students (science, reading and mathematics) measured by PISA determines the level of quality of the education system.

Given the topicality of the education quality and of key skills the countries implement content reform, which is characterized by the shift to the learning outcomes curriculum. There is an introduction of integrated curriculum standards, composed of subject knowledge, basic skills (mother tongue (or language of instruction), mathematics and science), transversal competences, such as citizenship and entrepreneurship, ICT/digital skills, personal development skills, social skills, moral values.

## 6 Conclusions

Answering the research question on the harmonization of educational reforms in Ukraine at the level of secondary education with the reforms in the countries of the world, we will give an affirmative answer. It is obvious that the updated legislation directs Ukrainian education to synchronization with global and European key benchmarks.

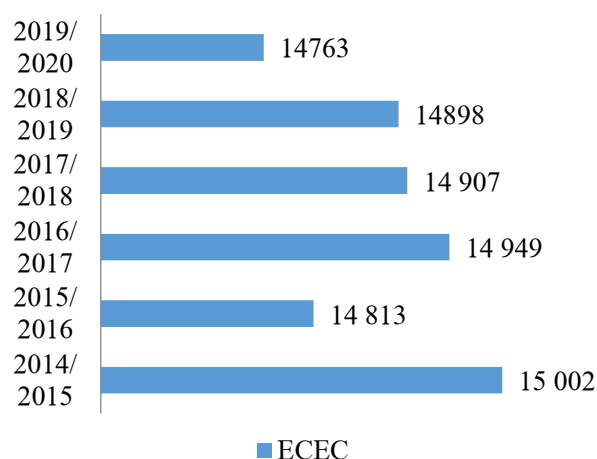
The Laws of Ukraine “On Education” and “On Complete General Secondary Education” introduce the following global benchmarks for the development of education:

- Lifelong and life-wide learning/education – formal, non-formal, informal education and various forms of its acquisition: institutional (full-time, part-time, distance, network); individual (external, family) (home), pedagogical patronage, in the workplace (at work) [16];
- Equal access to education – enrolment in primary school without a competition; territorial accessibility of general secondary education; financing of educational institutions at the expense of state and local budgets in the amount sufficient to meet state standards; compliance with the requirements of the legislation on the accessibility of educational institutions for persons with special educational needs;
- The quality of general secondary education, which is interpreted as the conformity of learning outcomes obtained by a student at the appropriate levels of general secondary education, to the state standards. State standards of secondary education determine the total amount of study load for secondary education students, the requirements for competencies to master at the appropriate level of general secondary education [17].

The results of the 2018 monitoring of the Ministry of Education and Science of Ukraine on the implementation of the reform show positive trends in the context of ensuring equal access to education:

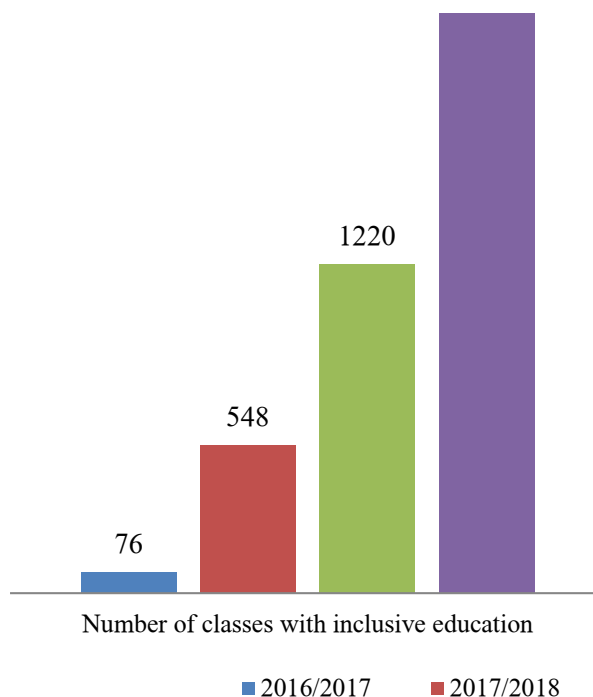
- Optimization of the network of educational institutions;

- Expansion of the ECEC provisions (figure 1);



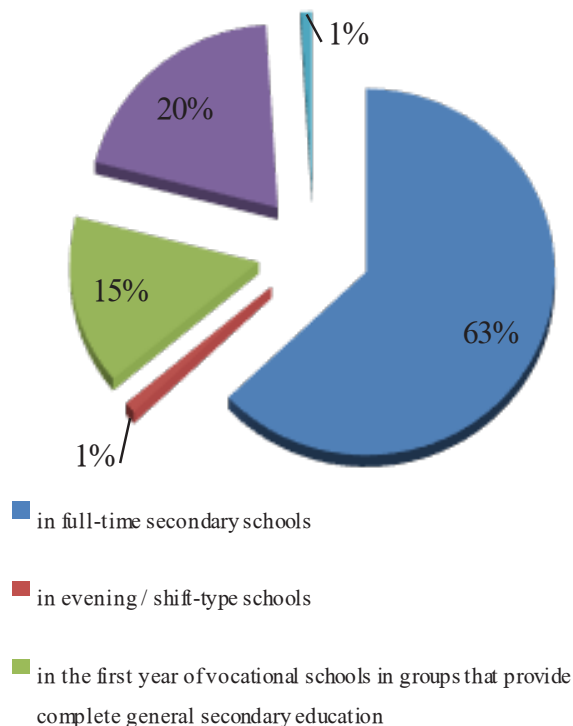
**Figure 1.** Dynamics in changes of the total number of ECEC provisions subordinated to the Ministry of Education and Science of Ukraine (2014 / 2015–2019 / 2020), [42].

- Increase of the number of hub schools. Support schools first appeared in Ukraine in September 2016 in the number of 137 in order to equalize children’s equal access to quality education in rural areas. As of June 1, 2018, there were 530 hub schools, i.e., their number increased in two years by 280%;
- Increase in the number of classes with inclusive education for the period from September 2016 to June 2018 more than 7 times (figure 2);



**Figure 2.** Dynamics in the number of classes with inclusive education, [42].

- in 2017/2018, almost 60% of students continued their education in full-time upper secondary schools, almost 2% – in evening upper secondary schools, 15.8% in VET institutions; almost every fourth graduate of the 9th grade of lower secondary school entered higher education institution (figure 3).



**Figure 3.** Further education of 9th grade graduates, [42].

There is also a transformation of secondary education into competence one. In particular, the reform of primary school as part of the of secondary education reform started. On the basis of the Law of Ukraine “On Education” the State Standard of Primary General Education was developed and approved [43].

Typical Educational Programmes of Primary Education (for 1-2 and 3-4 grades of the New Ukrainian school) are also competence-oriented [44].

These documents declare the comprehensive development of a child, of his/her talents, abilities, competencies and cross-cutting skills that ensure his/her readiness to live in a democratic and information society, to continue his/her education in secondary school as the aim of primary education.

At the same time, we agree with Sahlberg, who writes about the existence of a number of challenges in the process of implementing the proclaimed reforms. The lack of the ability to modify change strategies by continuously shaping and reshaping intentions, ideas and actions is named him as a challenge [45].

The list of key competencies approved by the Law of Ukraine “On Education” in 2017 is an example of the need for such a modification. The list is synchronized with the 2006 European Reference Framework of Key Competencies for Lifelong Learning. However, the European Com-

mission approved an updated list of key competencies responding to the new realities of Europe and the world in 2008 [29].

In our opinion, it is no less important for Ukraine to take into account the latest developments of the EU, which already ensure the implementation of the competence approach in secondary education the introduction of appropriate competence-oriented learning approaches and environments [46].

Therefore, Ukraine is to continue the reforms in order to further harmonise its education with the European and world education developments. The following recommendations look valid based on the analysis of reformist innovations in China, Germany and Poland: adherence to the key reform initiatives (ensuring equal access and quality of education), ensuring a balance between these key initiatives (obvious here is the importance of equal educational opportunities, especially under COVID-19 pandemic and improving both the quality of educational services and the quality of educational outcomes (knowledge and key competencies of graduates of secondary education), the continuity of these initiatives in case of the change of the Government, the duration of the announced reform initiatives and appropriate financial support.

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# The comparative analysis of challenges to the national education systems in Bulgaria and Ukraine (on the example of the tourism and IT sectors)

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**Abstract.** The article offers an overview of the global trends in education that have emerged during the 2020 economic recession; provides a retrospective analysis of the change in economic formations during the 1990s, which still influences the business environment and national education systems in post-socialist countries; analyses the structure of tourism flows in Bulgaria and Ukraine in the recent pre-crisis period; distinguishes the changes between local tourism markets in both countries and consequent demands to HEIs, training the workforce for domestic and international companies; outlines the IT services market in Bulgaria and Ukraine from the side of employment generating; points out the discrepancy between the requests to developers of IT solutions at the local level and the orders of transboundary corporations, which are the largest employers today for the economies in transition; presents the grouping of national economies by innovation performance according to the Global Innovation Index report; classifies non-material industries on the basis of potential for increasing added value and duplicating the product; indicates the restrictions of recreational capacity for the tourism infrastructure; highlights the disparity in clustering the world countries by absolute and relative Travel & Tourism impact to GDP; substantiates the need for interdisciplinary approach in composing the curricula for specialities of the related industries; emphasises the existence of thresholds in the process of increasing the professional competence level. The relevance is grounded by the ultimate changes within the current structure of the global economy, as the sphere of higher education is quite significant in the international trade in services; the general paradigm of the theory of international economic relations is being modified now towards the refusal from the resources' inexhaustibility postulate; thus the research novelty consists in the implementation of supporting programmes and strategies in the field of higher education under the consideration of these trends.

## 1 Introduction

National education systems continue to play a significant role in the stability of socio-demographic processes and the creation of products that are competitive in the global market, and, accordingly, ensure the country's GDP. Unfortunately, certain negative experience has been shown in this field. In the last decade, the state concept of national education in Bulgaria and Ukraine has evolved towards a narrowly focused specialisation, as the labour market felt the need for niche-specialised professionals. Today, the opposite trend is being observed, provoked by innovators – an interdisciplinary approach in solving practical problems and lightning-fast adaptation to the latest information technologies, which has become acutely relevant during the economic recession of 2020.

## 2 Literature review and problem statement

The literature we have used to corroborate our presumptions and findings is divided into three content groups. The

first one gives a brief overview based on economic history and some retrospective issues explaining current trends in education and policy measures implied by national governments – as they seemed odd and unreasonable for the population. The second group discusses the current crisis in traditional education and the suggested trends to change its methodology and the third outlines practical examples of resolving the most acute problems in the field of tertiary education. Some works are analysed in detail to highlight the preconditions to our research of the national education systems in Bulgaria and Ukraine.

1. The aspects of divergence between the high and secondary school (or professional) education demand in different European countries are discussed by M. Mysíková and J. Večerník [1]. The prevalence in social status was informally proved by higher education in the transition countries in Eastern and Central Europe (the former USSR block and its trade partners), so the beginning of the 1990s, as the researches highlight, depicted an outstanding gap between the need for higher education degrees in the “western” and “eastern” national economies, despite the stagnation of the latter. In the next decade, the situation changed dramatically,

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but the gap between countries emerging from different socio-economic systems is still being noted. We suggest the following explanation for this fact.

Without understanding some type of “psychological inclination” to academic knowledge and ephemeral perspectives that should have opened up for a learned person with a scientific degree (in theory broken by further mid-nineties crisis in the former socialist states), revealing the reasons for the inefficient model of governmental expenditures and “clumsy” labour market altogether with lagging productive forces that did not meet market needs, is in vain. Echoes of the conceptual perception that the sphere of vocational and higher education should first of all create an exceptional image of the state and prove the primacy of its scientific achievements in all sectors (without exception!), and only then meet the needs of the most profitable sectors of the national economy, are still felt in post-socialist countries. On the one hand, this paradigm made it possible to preserve the national higher education system (of course, with some losses) during the most crisis periods of the independence establishment in transition economies; on the other hand, it decelerated significantly the accumulation of intellectual capital demanded by the market and the “mind shift” towards market business models. But without a brief historical discourse, it is inappropriate to discover the processes that took place in the regulation of higher education in Bulgaria and especially Ukraine, where it was much more difficult to switch to a new economic model since the analysis of the strategy effectiveness based on efficiency and profitability simply did not work. According to O. Dvouletý [2], different patterns of economic (and entrepreneurial) behaviour might have influenced the protracted recession.

The study [1] covers 30 years, thus encompassing the main trends in their formation. The most interesting outcomes, given the topic of this article, outbreak some settled concepts. First, the authors prove the theoretical statement claimed by G. S. Becker in 1975 that “marginal returns to education fall as the proportion of the population with higher education rises”. Closer to modern conditions, the empirical explanation should take into account not only the growth of production with high added value (a logical repercussion of the labour force intellectualisation) but also the flow of a worker’s efforts from the production sector to recreation. The learned person (especially if increasing the average household’s income as the result of higher salaries compared to the unskilled worker) will search for more possibilities to rest and diminish the working hours, than for the ways to increase productivity. The desire to get away from routine work, which in theory should stimulate the invention of more advanced technologies, in reality, has transformed into outsourcing and the search for subcontractors with low rates, often in

poorer countries. Indirectly, it has led to opening the borders for unskilled labour force (ended in multiple social problems due to uncontrolled migration) and the emergence of a new stratum of employees – distant/freelance workers in knowledge-based industries. Digitalisation and 24/7 online access have led to equalization of wages to the minimum offered by the poorest countries (where workers are qualified enough for delegable jobs. Transnational companies prefer to educate their part-time workers themselves and pay less than hire residents from the headquartering region (with higher rates and strict labour legislation). In this case, the governmental support of the national education system is unprofitable.

Second, the level of returns to tertiary education differs significantly across European countries. In general, it is higher in the regions with low GDP and is lower in the most developed ones. Building the hypothesis empirically, we could hardly assume it. Scandinavian states are the most profitable, with a decent level of tertiary education, and namely, they showed the worst results. So, is the first statement irrefutable? Under these conditions, the governments should decrease funding to the national education systems, shouldn’t they? On the contrary, the high-income economies proceed to guarantee free or sponsored education not only to their citizens but to foreigners as well. We suggest that simplified regression or correlation models are not enough to reflect all interrelations between the state income, the quality of life of the local population and the importance of R&D and academic education. The highest possible share of educated people may crush the social unrest, so many governments prefer to pay extra for the piece than for civil conflicts resolution.

Third, the negative impact of tertiary education on labour productivity has been found only in the “west” group – the developed countries. It seems that economies in transition have some auxiliary period during which they need to boost R&D, GDP and the share of the population enrolled by tertiary education, until it becomes unprofitable in terms of labour productivity. In the globalised world with free resources transfer, it sounds strange, but M. Mysíková and J. Večerník substantiate their findings by trusted statistical tests.

The paper by K. Stefanova and N. Velichkov [3] covers a shorter period and less extent of the central and east EU countries and is also devoted to the efficiency of tertiary education expenditure. They say that human capital obtains a positive effect on the long-term economic growth, so its profitability should not be assessed for the short-term strategies. The 2018 CEE statistics represents the prevalence of tertiary education in employment among youth – on average, 82.9% of university graduates within the 25-29 age group managed to find a job, and only 77.7% of their counterparts who had stopped at

secondary education were hired (K. Stefanova and N. Velichkov, as opposed to the other cited papers, used employment ratios instead of personal income criterion, in the efficiency evaluation). The Europe 2020 Strategy aimed at 40% share of the total population with tertiary education; Czechia, Estonia, Latvia, Lithuania, Poland and Slovenia have already reached it. But even with the other CEE member states with lower rates, the EU average for age group 30-34 made 40.7% in 2018. On the contrary, the authors of [3] try to argue the positive effect of higher education attainment on economic development (it might not be entirely correct to empirically extrapolate their findings to other EU countries).

2. F. Balázs [4] discovers the importance of various competencies in global labour market forecasts, and names two skills that will be in demand. They are complex problem solving and cognitive flexibility, which should shift formal tertiary education intended on professional competences forming to communication and emotional intellect, supplemented by foreign languages proficiency and “telecollaboration” – the ability to communicate distantly. Note that this is a general trend in the reform of national education systems, which at first looked imposed from the outside, especially for countries with a traditionally rigid approach to organizing the educational process and control of knowledge. This approach can even harm if it is used irrationally and does not take into account the specifics of the so-called “classical specialities” (mainly natural sciences, where a student must accumulate the minimum set of concepts, without which building his/her hypotheses and applying scientific search methods is impossible). The law-based unification of the ratio between the class and individual work in Ukraine happened to be a bad experience, a fortiori, the ECTS system did not set so strict recommendations.

The concept of increasing the value of soft skills is not rejected by most researchers, but practical evidence proves that they must be supported by professional skills (the latter may be unique for each company – of course, it exaggerates the educational curriculum; some core niche professional issues are the trade secret and thus cannot be granted to the university programme) – so, the real task is to find the proper equilibrium between technical competences and communication. K. N. Tang [5][5] discovers the current attitude toward soft skills maintenance among teachers. The researcher insists that communicative, creative thinking and other skills are more in favour among the employers as they are transferable through many jobs. T. Bolli and F. Pusterla [6] have decided to test the significance of IT skills in managing business processes and intranet communication. They have found out that the first is much more important for companies’ performance

(the hypothesis was tried on high-education workers).

V. Lukesch and T. Zwick [7] raise the problem of competence between academic and vocational education. Close to work [1], the authors use income data for workers with tertiary education compared to those who finished vocational schools and try to find a correlation between the academic degree and higher personal income (their research covers only Germany). The outstanding experience of the German national education system is a dual apprenticeship, thus the demand for genuine academic education is traditionally lower than in other EU countries, which should be taken into account. When the other countries only started to discuss the possibility of merging vocational schools and classical HEIs, Germany had gained a unique practice of preparing graduates ready to return invested funds (expenditures on education) immediately. More than that, close cooperation with the real sector enterprises keep HEIs from spending extra money on professional equipment and training laboratories, which can be useful in the preliminary stages, when getting acquainted with the technological process in general, but is not able to copy the entire technological cycle. The institutions issue “the tertiary vocational education certificate”, which is recognised by many companies and guarantees employment. Also, the system of vocational certification and academic degrees are embedded into the unified system of educational levels, which may seem too complicated for foreigners and often revokes the international nostrification of vocational degrees, but is very popular within the country as provides for multiple combinations of training methods. In general, V. Lukesch and T. Zwick found out, that there is no significant difference in earnings between the groups of students who graduated from vocational schools and traditional HEIs of the matched levels of education. Unfortunately, this experiment cannot be carried out in its pure form in other countries, since the results are based precisely on the uniqueness of the German education system. On the other hand, the achieved absence of an income gap and, which is even more important, in social status creates fewer prerequisites for social tension in society, especially among ambitious youth.

Studying tertiary education, one must not forget that school (secondary) education creates – or does not create – its sound background. T. Meyer and S. L. Thomsen [8] are discussing the problem of the duration of university preparatory schooling. In Germany, it had taken 13 years, and was shortened to 12 years in the mid-2000s. The main apprehension stakeholders having concerned about, had been the curriculum that would not have been changed. It turned out that pupils were able to finish the curriculum in less time and proceed with their studies at HEIs with slight difficulties, which were dissipated

after the transition period had been completed. We will come back to this issue later when considering a similar problem with the reduction in the length of schooling in Ukraine.

Long-term schooling was uncharacteristic for post-socialist countries, where the accepted number of years had equalled 10. The secondary school had not formally been divided into grades, the pupil had been enrolled at the age of 6–8 in the 1st grade and then had graduated from the 10th grade (receiving full secondary education and being able to enter the HEI), or from the 9th grade (entering vocational schools). The administrative economics routine had prepared skilled employees as soon as possible, as the labour market had been controlled and the level of unemployment had been the lowest (to fulfil this goal, the practice of normative hiring and sending graduates to distant geographic regions had been used). The transition period in the mid-1990s introduced the 11th grade (with the simultaneous cancelling of the 4th one – pupils seemed to “jump over” it), and in the short run schooling education was prolonged to full eleven and then – twelve years. One of the reasons could be high unemployment and the need to reduce the load on local labour markets which began to suffer from oversupply as the real sector was ruined in multiple industries. T. Meyer and S. L. Thomsen say that the reduction of schooling was aimed to help students start their professional career one year earlier. The reform was initiated in times of global economic expansion and seemed quite logic (further world economic stagnation of 2008–2009 was not forecasted before).

V. Vandenberghe [9] explains the need to shorten the duration of tertiary education by population ageing, the elders’ demand of goods and services and consequently – the growth of educated youth who will produce GDP and will be able to take loans earlier. Simultaneously, the duration of part-time education and professional training should strengthen. It seems that the threat of unemployment seems negligible compared to decreasing the age of potential consumers who must have become completely legally capable.

3. The market economy is remarkably quick to respond to consumer demands. If some product or service is not yet available, but its vision is formed and formalized in specific requests, innovative firms start production if the profitability forecasts are at least a bit positive. MOOCs (Massive Open Online Courses) have gained their popularity far before the 2020 pandemic. The new time-saving model of getting fragmentary highly-specialised skills from various geographically dispersed providers solves multiple challenges of contemporary transboundary employees. As in the case of any innovation, there was no need to control and predict its development

before mass involvement. In 2020, MOOCs became a competitive alternative to traditional academic and vocational education. Within the network of secondary schools and HEIs, so-called intrinsic MOOCs – or massive closed online courses platforms (opened only for the enrolled students) – emerged. Some educational institutions managed to introduce the new technology quickly, the others lacked the minimal set of human and technical resources – and are close to losing their students. But it is obvious that the inspiration and experience of MOOCs have been embedded into the current offline structures and thus need more research of their principles and efficiency.

A. Holzweber [10] pays attention to motivation triggers in e-learning. The role of a teacher is merely to facilitate than to transfer knowledge, but some scientific disciplines need a specific approach. Namely, A. Holzweber discerns foreign language lessons, which are traditionally based on face-to-face communications in teaching. H. W. You [11] studies the individual student’s perception and the ways of successful MOOCs’ completion, and introduces the terms “perceived usefulness” (contribution to personal skills via certain technologies) and “perceived ease of use” (the appreciation level of innovative educational technologies). The author uses the threat factor among the others when estimating the students’ readiness to get knowledge online; this viewpoint is rare as the majority of researches pay attention predominantly to technical aspects. Nevertheless, the factor of psychological non-perception must be evaluated, especially within the framework of long-life learning involving people of different ages and from various backgrounds.

A. Griva, C. Thanopoulos and S. Armakolas [12] consider different stages of the educational process as a single cycle of knowledge acquisition and state that information technologies should take into account the specificity of each stage. Information coding is a principal intermediary process at transferring the knowledge from a teacher to a student, and the learning environment, either offline or online, must be created in the best way to support it. As European Commission distinguished in 2018 four types of digital skills (universal ones, for everyday life; skills for the labour force; skills for ICT professionals; educational ones), the curriculum competencies have to be classified according to the content of these groups and included into the learning process. R. A. Karim et al. [13] single out mobile learning technologies, which are expected to surpass applications for other devices.

O. Dvouletý [2] emphasises the concept of open innovation, stimulating entrepreneurship and subsequent economic growth. In work [14], the business models of transforming the national education based on the shift from core state institutions to private establishments are revealed, a franchised certificate



programme from a reputed overseas university, education start-ups and hubs with curricula for the pre-defined stakeholders (such as local and foreign communities or commercial partnerships), among them. Ukraine plans to implement the first option to some extent since 2021, by legalizing accreditation of national educational institutions by foreign certification centres (their list is determined at the legislative level, in the Decree of the Cabinet of Ministers of Ukraine No 811 of 09.09.2020).

### 3 The aim and objectives of the study

The current research aims to substantiate the interconnection between the provision of the country's residents with educational infrastructure (with special emphasis on tertiary education) and the potential of the national economic system. Not only short-term factors of personal income and the current state of the labour market but also the accumulation of intellectual capital and a reliable base for the R&D large-scale projects should be taken into account when planning state funding for educational institutions. The structure and logic of the presented paper consist of three blocks of interrelated challenges that the global service industry has faced recently. The first section covers the challenges to the traditional education system in the field of tourism, which have arisen from the unforeseen restructuring of the global business model; the second section is devoted to the analysis of the companies' interaction in the tourism and IT industries, and how this affects the curricula content of related knowledge branches; the third section highlights the problems that objectively appear due to the new trends in the global market, but could be hardly resolved by educational institutions on their own without the state support.

### 4 Challenges to academic tourism education related to the global economic crisis

The creation of travel services requires the participation of companies from a wide variety of industries. Within the framework of this study, we will consider options for interdisciplinary cooperation and attempt to assess the mutual influence of different areas of activity using the example of an interaction between tourism and the IT sector. When having prepared this article (December 2020), we were not able to apply to the annual official statistics (as it had not yet been published) covering the maximum period of the crisis. For the indicators below, the 2019 figures are mainly focused on, however, it should be clear that significant adjustments are possible in the next year. However, they will affect more dynamics and absolute values than the structure of the national economy, which depends on business practices and mode of cooperation, which usually take several years to change. Table 1 contains the main indicators of the tourism economy state [15, 16].

By the absolute figures, the volumes of the tourist economy of Ukraine exceed in most cases the similar in-

dicators in Bulgaria, which can be explained, besides, by the area difference of the two countries.

In the pre-crisis period, the impact of tourism on Ukraine's GDP exceeded the output of the recreational industry in Bulgaria by 1 US\$ bn. In terms of employment, Ukraine exceeded Bulgaria by more than 2.6 times (with an average employment of about 330 thousand people per year, while in Bulgaria just over 120 thousand jobs were created). The same is true for the absolute indicators of tourist flows: Ukraine's foreign trade turnover in value terms exceeded Bulgaria's indicator by 1.4 times (9.7 and 6.9 US\$ bn, respectively), and quantitatively – by 2.6 times (41.3 and 15.5 million visits). The consumption of tourism services in the domestic market was also 4.4 times higher in Ukraine (4.87 versus 1.11 US\$ bn), and its contribution to the country's GDP was 2 times higher. However, if we analyse the structural and relative indicators, then at a larger scale, the tourism economy in Bulgaria functioned more efficiently than in Ukraine.

Firstly, Bulgaria's foreign trade balance is positive, in value and quantity (the country earned from exports by 2.6 US\$ bn more than its citizens spent on travel abroad, and accommodated foreign citizens by 2.6 million more, than the residents of Bulgaria went on vacation outside the country). Citizens of Ukraine, on the contrary, spent on foreign travel by 5.3 US\$ bn more than national travel companies earned from exports, and the total excess of the outbound flow over the inbound one made 12.9 million visits. The specific contribution of tourism production to GDP, employment of the population and especially the total export of goods and services (11.2%) in Bulgaria are higher than in Ukraine. The specific income per one foreign tourist in Bulgaria is approximately US\$ 530, while in Ukraine only 155 US\$. Although the costs of one tourist travelling abroad are also higher in Bulgaria – US\$ 330 versus 275 in Ukraine. The three-sectoral structure of tourist flows in Bulgaria is distributed in favour of exports (60%), the costs of imports are twice the consumption of residents in the domestic market. In Ukraine, the share of export earnings is minimal (15%), more than 50% comes from imports, consumption in the domestic market has been gradually increasing recently and in 2019 it was 35%. This rise in domestic demand was caused by a deterioration in household earnings, as people with upper middle income prefer to travel abroad.

The average world ratio is distributed in favour of the domestic market (50%) and approximately equally (20-22% each) between imports and exports. Interestingly, in monetary terms, the world balance of foreign trade in tourism services is positive (148.5 US\$), which may indicate an almost parity distribution of income and costs between states at the global scale, while the outbound flow exceeds the inbound one by 131.5 million visits to foreign countries. It can be assumed that, in general, the outbound flow is less expensive; the average "global tourist" spends more overseas than his/her country earns on foreign tourists. This is confirmed by the calculated data: earnings per arrival made US\$ 1 160, while costs per departure – US\$ 964. The contribution of both Bulgaria and Ukraine to the absolute indicators of the global market is

**Table 1.** Comparative indicators of tourism economics in Bulgaria, Ukraine and the world

Indicators, 2017-2019 average		Bulgaria	Ukraine	World	Ratios	Bulgaria	Ukraine
Direct contribution to GDP	US\$ in bn (real prices)	2.15	3.08	2 669.60	% of WT	0.08	0.12
	share of total GDP, %	3.30	2.15	3.16	% of WT	–	–
Direct contribution to employment	thousands of jobs	123.04	329.04	116 734.33	% of WT	0.11	0.28
	share of total employment, %	3.88	2.01	3.71	% of WT	–	–
Domestic Tourism Spending	US\$ in bn (real prices)	1.11	4.87	4 011.37	% of WT	0.03	0.12
	share of total GDP, %	1.62	3.27	4.66	% of WT	–	–
Outbound T&T Expenditure (Imports)	number of departures (thousand)*	6 464	27 124	1 534 054	% of WT	0.42	1.77
	US\$ in bn (real prices)	2.14	7.49	1 478.20	% of WT	0.15	0.51
	share of total imports, %*	5.46	11.88	6.49	% of WT	–	–
	share of total GDP, %	3.29	5.24	1.76	% of WT	–	–
Visitor Exports (Foreign spending)	number of arrivals (thousand)*	9 078	14 167	1 402 585	% of WT	0.65	1.01
	US\$ in bn (real prices)	4.80	2.20	1 626.74	% of WT	0.29	0.14
	share of total exports, %	11.17	3.32	6.71	% of WT	–	–
Trade Balance (Exp – Imp)	US\$ in bn (real prices)	2.65	–5.29	148.53	% of WT	1.79	–3.56
	visits, arrivals - departures (thousand)	2 615	–12 957	–131 470	% of WT	–1.99	9.86
Total Trade Turnover (Exp + Imp)	US\$ in bn (real prices)	6.94	9.69	3 104.94	% of WT	0.22	0.31
	visits, arrivals + departures (thousand)	15 542	41 291	2 936 639	% of WT	0.53	1.41
Total tourist flow (exports + imports + domestic tourism)	US\$ in bn (real prices)	8.04	14.55	7 116.31	% of WT	0.11	0.20
	Share in the total tourist flow, %:	100	100	100	difWA	–	–
	Domestic Tourism Spending	13.7	33.4	56.4	difWA	–42.6	–22.9
	Outbound T&T Expenditure	26.7	51.4	20.8	difWA	5.9	30.7
	Visitor Exports	59.6	15.1	22.9	difWA	36.8	–7.7
International Tourism Efficiency	earnings per arrival, US\$	0.528	0.155	1.160	N/W	0.46	0.13
	costs per departure, US\$	0.332	0.276	0.964	N/W	0.34	0.29

\* World Bank data, 2017-2018 average; % & of WT – share in the World Total; difWA – difference from the World Average; N/W – National to World ratio

extremely low and does not even reach 0.5%. Assuming that about 200 national economies take part in world economic relations, i.e. independent countries and territories with special status (WTTC collects data on 162 of them), then theoretically, each such unit accounts for an average of  $100\% / 200 = 0.5\%$ . Suppose that only 150 countries participate in global tourism, so the share of possible participation will increase to 0.67%. Bulgaria has almost reached this margin in terms of the number of foreign visits (international arrivals if we use the UNWTO terminology) – 0.5% of the global flow, foreign trade turnover is 0.53% of the world indicator, also in quantitative terms.

Thus, further development of the domestic infrastructure for receiving foreign tourists and stimulating the domestic market can be called a priority development for the national tourism economy in Bulgaria, while in Ukraine the export sector is a problematic one, which sagged after

the start of the anti-terrorist operation in part of the eastern territories in 2014. But even earlier, there was an adverse trend of increasing the negative balance of tourist flows, the scale of which was much more significant than official statistics showed. With the increasing popularity of individual tourism and the improvement of software products for self-organised tours, fewer people turn to travel agents for intermediary services, which also makes it difficult to track visits and especially costs at the place of stay. Thus, the different needs of both travellers and companies that create tourism services for specific local markets lead to completely different specialisations for application developers and training programs. For guaranteed employment in Ukraine, a university graduate with a degree in Tourism must have different knowledge and skills than a future employee of a travel company in Bulgaria. In Ukraine, most companies work to organise outbound trips, while in

Bulgaria the market demands differ completely. Accordingly, local companies need fundamentally different IT solutions. If Ukrainian SMEs are not individual consumers of specialised software, confining themselves to the content within corporate accounts on aggregating portals and performing, in general, unified business processes, then enterprises attracting and accommodating tourists in their region need a more diverse product. Besides, the local information infrastructure must be maintained at a decent level, so the customers of large projects are both local municipalities and governmental institutions. In Bulgaria, the collection of statistical data on tourist flows is more detailed than in Ukraine – not only annual but also monthly indicators are processed. In Ukraine, the seasonality of visits is not confirmed by any official reports of the host companies. A detailed system of official statistics requires sophisticated software to automate data collection, in addition to the time required to prepare them for the respondent companies.

In general, the more diverse IT products are used, the more jobs are created in the industry, not only directly for development, but also routine maintenance and upgrades, as well as on-site staff training. If it is possible to buy a finished product or order an individually developed application via outsourcing, even in another region of the world, then it is difficult to organise high-quality operational service remotely, taking into account local specifics, and large companies with sufficient funds begin to hire local specialists, although a few years ago there was a tendency to place orders in countries with minimum wages and marginal qualifications. Both in Ukraine and Bulgaria, the trends in the IT labour market are similar: the majority of local specialists work in outsourcing for large foreign companies, mainly in North America and some countries of Western and Northern Europe, and Israel. Local technical universities are less focused on the needs of national customers, following the current trends of foreign employers (after all, an important criterion for the success of a training program is the employment of its graduates). It would seem that there should be no contradictions, because software products are generally universal for the same industries, and the global network infrastructure provides 24/7 communication between the developer and the consumer. However, the use of off-the-shelf software is highly dependent on hardware, and while developed countries can afford the most innovative hardware, middle-income ones lag in this process. Obsolescence/amortisation of computer equipment sets in quickly, in six months or a year, at most two (which is also fuelled by the hasty updating of hardware and software by manufacturers, who in turn have to reckon with the effect of expanded reproduction to increase profits) – and it stipulates a paradox when local companies from the leading country in the development of this or that software do not purchase it from the customer company, although there are more than enough local specialists who are ready to arrange promotion and maintenance. Excluding the cases of order fulfilment for individual markets and control over the non-proliferation of finished products outside the contract, the reason usually becomes the obsolescence of equipment among the majority

of active users of IT services, especially households and SMEs. Linux-based systems are less resource-demanding, therefore, despite the increased complexity of training for the average user, they are gradually replacing Windows-based systems from the local markets. In Bulgaria, there is not even an official representative of Certiport yet (the office in Macedonia is in charge) – an organization that supervises the preparation and passing of professional exams for software products certificates of famous world developers, including Adobe, Autodesk, Microsoft and Unity.

N-iX company has conducted a comparative analysis of the IT outsourcing market in Bulgaria and Ukraine. The quality indicators for training specialists are higher in Ukraine, while the general state of the business environment and infrastructure is higher in Bulgaria. In comparison with other countries of the world, according to international ratings, in terms of the level of innovative development, two countries are in the same classification group (table 2) [17–20].

In the 2020 GII report, an interesting classification of economies is given: the countries are clustered by the level of income and expectations to innovate, empirically dependent on it (table 3). In the GII report, national economies were prior classified by income groups and then divided into three categories by the level of the innovation. To facilitate the comparison between different income groups, we have normalised the GDP per capita (in terms of PPP) within each of the 12 categories. The range of the normalised indicators does not exceed 1.5–2 units except for one subgroup, so we may state that the states implementing similar innovative policies are approximately homogeneous by their citizens' annual income. This double grouping aimed to highlight the countries which earn nearly the same budgets as their counterparts but prefer to spend funds on innovative development.

On the other hand, some countries may receive the highest income within their group, but neglect innovations. Both Bulgaria and Ukraine are innovative leaders in their categories and are distinguished by the highest purchase power parity, which makes the national workforce and infrastructure maintenance cheaper than the competitors suggest.

The 2019 report says that Ukraine “has the world's second lowest Big Mac price of \$1.64, cost of living is 58.29% lower than in the United States” [[18], p. 9]. The country occupies the 4th position in the World Bank Tertiary Education Enrolment Index and ICT is the 3rd largest export service industry [[18], pp. 10, 19].

We will not focus on the tourism market and related sectors decline caused by the global crisis in 2020. During any historical era, periods that are unfavourable for a particular industry inevitably arise. Moreover, in countries that are not involved in military conflicts on their territory (the majority of them in the aggregate), the tourist infrastructure has not suffered, i.e. there was no physical destruction of recreational facilities and, if this term can be applied to the service sector, means of labour and objects of labour were kept untouched. Even intangible services are created using tangible media – for example, to write a computer program, you need special equipment – hard-



**Table 2.** Comparative indicators of Bulgaria and Ukraine in the field of IT (most figures from 2019 reports)

Indicator	Bulgaria	Ukraine
IT export	2.5 US\$ bn	4.5 US\$ bn
IT hubs (number of cities)	Sofia, Plovdiv, Varna, Burgas (4)	Kyiv, Lviv, Kharkiv, Odesa, Dnipro (5)
IT professionals	70 000	184 700
IT companies listed on Clutch, units	>130	580
Annual ICT graduates	2 000	15 000
English proficiency	high	moderate
Literacy rate, % of adult population	98.4	99.8
Best programmers by SkillValue, place	12	5
Programmers ranking by TopCoder, place	20	6
The "Ease of doing business rank" (Doing Business 2020)	61	64
AT Kearney Global Services Location Index, rank	17	20
Global Talent Competitiveness Index 2020, rank (score)	44 (45.76)	52 (41.47)
Global Innovation Index 2020, rank	37	45
Economies group by GII	Lower middle-income	Upper middle-income

ware; to arouse the interest of potential visitors to a tourist object (physical form) or an event (non-material form), it is necessary to carry out preparatory work, and it is not based solely on information exchange. Media content creation is also impossible without physical equipment. Therefore, the crisis faced by many service providers is a crisis of a lack of demand. Its nature is somewhat different from the crisis of overproduction when demand falls due to market saturation – i.e. buyers satisfied their needs and stopped at some point to "recycle" the purchased product or service.

2020 is characterised by an almost complete absence of demand, brought to the final stage, namely purchases (the flow of cash and their equivalents from the consumer's wallet to the manufacturer's account), with a simultaneous desire to still use "prohibited products". The market received a peak intensity of the so-called desire to buy, especially at the lockdown beginning, when the population had enough funds and rather optimistic forecasts were made in the medium term. If we simplify the way of thinking of the average consumer, then the following logical chain emerges: "I have money that I planned to spend on travel, i.e. pleasure – a travel and many types of recreation within daytime availability were banned (shopping and entertainment events) – the desire to receive emotional relaxation and positive emotions remained unfulfilled – what can I do now (read, what I can buy immediately) to compensate for this desire?" That is why the beginning of the quarantine period was characterised by an unprecedented boom in sales of various consumer commodities, especially via online stores and those trading companies that were able to establish prompt home delivery in compliance with local sanitary and epidemiological standards established at the legislative level. When the first peak of positive expectations passed and the lockdown period was forecasted for a longer period, but funds from the tertiary sector were still sufficient, sales of online content (non-material products) began to grow.

The trend towards intangible consumption was especially clear on open educational platforms and other re-

sources with educational and cultural content. There are no aggregated official data, but we assume that the costs of servicing the MOOCs, cultural and art institutions that provided online access to their collections for more than half a year were financed partly from state budgets and partly by sponsorship contributions from multinational companies. This decision lay in the psychological, not economic, scope: it was necessary to reduce the emotional stress that arose in countries with particularly stringent quarantine measures. According to preliminary calculations, it should have been cheaper than organizing a system of psychological support with the involvement of qualified highly paid specialists. Also, many workers whose professional activities were suspended for a long time began to search for quick retraining options. The commercialization of the online educational services market started, but the proposals came mainly not from academic institutions, but from freelancers, representatives of the so-called "digital professions" that have become so popular, some companies that decided to cut costs by firing full-time employees and trained freelancers from the regions with lower pay rates; finally, as in any crisis period, fraud retraining courses were offered in a state of initial confusion.

Academic institutions, despite the availability of sufficient material and technical background and the accumulated amount of knowledge, were unable to reorient themselves to the emerging free niches (which could be considered as temporary mini-projects) partly due to the bureaucracy and sluggishness – traditional characteristic of classical universities, partly due to regulatory restrictions in the provision of services to third parties which could not be signed to the standard contract. The crisis for universities began later, with the start of the new academic year (September 2020). By this time, the funds of the state budget gradually dried up due to the reduction in GDP and, accordingly, the question of cuts in funding for non-priority sectors, and the inflow decay of students of full-time education (many began to equate distance learning with part-time) and foreign students – these two flows have been traditionally the main sources of funds formation for

**Table 3.** Grouping of national economies by innovation performance (based on the income level)

Income status	Correspondence with the level of development		
	Above expectations	In line with expectations	Below expected
High-income	1) Singapore: 1.723; 2) Ireland: 1.459; 3) Switzerland: 1.206; 4) United States: 1.093; 5) Hong Kong, China: 1.074; 6) Netherlands: 1.004; 7) Denmark: 1.001; 8) Germany: 0.951; 9) Sweden: 0.944; 10) Canada: 0.873; 11) Finland: 0.862; 12) United Kingdom: 0.824; 13) France: 0.819; 14) South Korea: 0.734; 15) Japan: 0.729; 16) Israel: 0.706 (Mean GDPpc – 57 325.59 US\$; $range_{norm} - 1.017$ )	1) Luxembourg: 2.561; 2) Norway: 1.441; 3) Iceland: 1.265; 4) Austria: 1.245; 5) Belgium: 1.150; 6) Australia: 1.119; 7) Malta: 0.954; 8) Italy: 0.940; 9) New Zealand: 0.936; 10) Spain: 0.892; 11) Czech Republic: 0.886; 12) Cyprus: 0.867; 13) Slovenia: 0.847; 14) Estonia: 0.795; 15) Portugal: 0.758; 16) Poland: 0.702; 17) Hungary: 0.694; 18) Latvia: 0.667; 19) Greece: 0.663; 20) Croatia: 0.617 (Mean GDPpc – 45 673.45 US\$; $range_{norm} - 1.943$ )	1) Qatar: 2.165; 2) United Arab Emirates: 1.545; 3) Brunei Darussalam: 1.408; 4) Kuwait: 1.160; 5) Saudi Arabia: 1.089; 6) Bahrain: 1.066; 7) Lithuania: 0.810; 8) Slovakia: 0.734; 9) Panama: 0.714; 10) Oman: 0.657; 11) Trinidad and Tobago: 0.605; 12) Chile: 0.553; 13) Uruguay: 0.495 (Mean GDPpc – 44 375.30 US\$; $range_{norm} - 1.671$ )
Upper middle-income	1) Bulgaria: 1.415; 2) Costa Rica: 1.227; 3) Thailand: 1.139; 4) Serbia: 1.096; 5) North Macedonia: 1.030; 6) China: 0.965; 7) Georgia: 0.905; 8) Armenia: 0.812; 9) South Africa: 0.798; 10) Jamaica: 0.614 (Mean GDPpc – 16 144.02 US\$; $range_{norm} - 0.801$ )	1) Romania: 1.637; 2) Malaysia: 1.556; 3) Mauritius: 1.256; 4) Montenegro: 1.178; 5) Mexico: 1.118; 6) Belarus: 1.062; 7) Lebanon: 0.873; 8) Colombia: 0.829; 9) Brazil: 0.825; 10) Bosnia and Herzegovina: 0.821; 11) Iran: 0.805; 12) Albania: 0.763; 13) Peru: 0.719; 14) Jordan: 0.558 (Mean GDPpc – 18 067.20 US\$; $range_{norm} - 1.079$ )	1) Russian Federation: 1.623; 2) Turkey: 1.622; 3) Kazakhstan: 1.516; 4) Argentina: 1.349; 5) Dominican Republic: 1.045; 6) Botswana: 1.040; 7) Azerbaijan: 0.844; 8) Sri Lanka: 0.761; 9) Paraguay: 0.753; 10) Ecuador: 0.682; 11) Algeria: 0.679; 12) Namibia: 0.585; 13) Guatemala: 0.502 (Mean GDPpc – 44 375.30 US\$; $range_{norm} - 1.671$ )
Lower middle-income	1) Moldova: 1.365; 2) Ukraine: 1.364; 3) Mongolia: 1.309; 4) Tunisia: 1.183; 5) Philippines: 0.941; 6) Vietnam: 0.839; 7) Morocco: 0.820; 8) India: 0.716; 9) Kenya: 0.463 (Mean GDPpc – 9 251.03 US\$; $range_{norm} - 0.902$ )	1) Indonesia: 1.793; 2) El Salvador: 1.358; 3) Cabo Verde: 1.087; 4) Uzbekistan: 1.066; 5) Honduras: 0.891; 6) Kyrgyzstan: 0.811; 7) Senegal: 0.521; 8) Zimbabwe: 0.472 (Mean GDPpc – 6 482.26 US\$; $range_{norm} - 1.321$ )	1) Côte d'Ivoire: 2.814; 2) Egypt: 1.653; 3) Bolivia: 1.249; 4) Lao PDR: 1.098; 5) Ghana: 0.755; 6) Nigeria: 0.749; 7) Myanmar: 0.722; 8) Pakistan: 0.678; 9) Bangladesh: 0.647; 10) Cambodia: 0.604; 11) Cameroon: 0.523; 12) Zambia: 0.507 (Mean GDPpc – 7 037.83 US\$; $range_{norm} - 2.307$ )
Low-income	1) Tanzania: 1.583; 2) Rwanda: 1.281; 3) Madagascar: 0.986; 4) Mozambique: 0.784; 5) Niger: 0.728; 6) Malawi: 0.639 (Mean GDPpc – 1 674.18 US\$; $range_{norm} - 0.945$ )	1) Nepal: 1.340; 2) Tajikistan: 1.331; 3) Mali: 0.940; 4) Uganda: 0.875; 5) Burkina Faso: 0.874; 6) Togo: 0.640 (Mean GDPpc – 2 484.38 US\$; $range_{norm} - 0.700$ )	1) Benin: 1.451; 2) Guinea: 1.144; 3) Ethiopia: 0.970; 4) Yemen: 0.434 (Mean GDPpc – 2 228.56 US\$; $range_{norm} - 1.017$ )

GDP per capita, PPP in international US\$ is normalised by the formula  $x_i/x_{mean}$  and sorted in descending order; income data source – the World Bank group, taken 2017-2019 average (2018 latest available for Yemen)

HEIs. The factor of the bankruptcy of travel companies and providers of various recreational services is the objective lack of demand for several months and the absence of a “financial safety cushion” – reserve funds in accounts that would help to freeze activities for about a year without losing assets. Moreover, tour operators often work on credit with final service providers (hotels, transport companies, insurers, etc.). In any case, they were forced to cover short-term accounts payable, unless it was possible

to prove the fact of force majeure and if the terms of the contract directly indicated this point. In turn, the final (in the tourism product creation chain) suppliers had to settle accounts with their contractors, and even if they managed to reduce their receivables, unpaid invoices remained.

Despite the positive examples of innovation and profitable reorientation of traditional businesses, we do not agree with the thesis that analysts of a particular industry periodically express. It says that only enterprises un-

able to realize new opportunities and offer existing loyal consumers a product adapted to new conditions have lost demand and income. Of course, the experts are partly right. However, it should be resolved that there are activities whose products cannot be completely converted into online or remote consumption. Virtual reality will not replace a tour, the key characteristic of which is direct physical contact with the natural environment, therapeutic climatic factors, objects of display, i.e. being in a specific geographic location. On the other hand, those companies that were temporarily out of work could compensate for some of their losses by providing other services to companies whose activities have not been suspended. For example, enterprises in the service sector, having teamed up with universities, could in a fairly short time create training courses for the MOOCs or a series of webinars, dividing the profits from their sale in emerging niches or using part of government transfers. Profits would be generated due to economies of scale, and the exchange of experience between specialists in the theoretical and practical fields of knowledge would increase the level of the intellectual capital of all participants. But only a few went this way, mainly those universities, which even before the crisis had established dual education. An obstacle for the rest, in addition to inertia, was the ban on the implementation of other activities, except those permitted by the statutory documents. If a travel company did not have the right to engage in educational or consulting services (in Ukraine and many other countries there is a severe restriction on the list of permitted types of business according to the Classifier of Economic Activities, which determines the policy of tax and financial reporting), then it actually could not qualify for payment consulting services during the creation of an educational project. If a simplified mechanism of interaction between stagnant and stable industries was developed for the quarantine period, part of the funds would be redistributed within such temporary contracts, which would reduce the pressure on social programs to support individual entrepreneurs and prevent unemployment. Of course, such cooperation mechanisms, which are contrary to current legal regulations, provide an opportunity for fraud, but dishonesty in commercial transactions is always characteristic of operational activities that do not meet an unambiguous, strictly defined set of procedures.

In the absence of communication with employers in the real labour market and total projected unemployment in “suspended” types of activities, universities that train specialists in professions unpopular in the new conditions begin to suffer losses. Psychologically, people are prone to immediate consumption and assessment of prospects according to the “here and now” principle, so many applicants will not choose a profession related to tourism and recreation in the next year or two (they do not reason logically that after the end of the quarantine period, demand for real, not virtual travel, will boost; and it will take at least three years to study for a bachelor’s degree). At the level of regulatory bodies of the national education system (ministries and departments), it is necessary to provide alternatives to support temporarily unpopular specialties by the next academic year, using an interdisciplinary

approach: it is possible to remove the existing legal restrictions on the curricula content in favour of a block of disciplines in a related knowledge branch so that the future student will have received the minimum necessary knowledge in the main speciality, and at the same time the basic block, which will allow him/her, in case of the bleakest prospects, to find a job in a related industry. For example, by combining the specialities of tourism and information technology (not necessarily classical programming, which requires excellent knowledge in the field of mathematical sciences and its inherent abstract thinking – on the contrary, you can focus on SEO, creation of multimedia products, Internet marketing), or tourism and finance (by making emphasis on planning and analysing indicators of intangible production and international financial transactions), it will be possible to somehow revive the popularity of the speciality, retain the scientific and pedagogical staff and reduce the influx of applicants to specialities with the highest competition and lack of vacancies. The question that is now more interesting for parents or guardians than for modern students – about formal qualifications according to the document on higher education. In the new conditions of the labour market, formal certificates began to lose relevance even in the pre-crisis period. Innovative companies and start-ups take into account the creative potential of the employee; his/her desire to develop in the chosen profession and the availability of real knowledge. The official diploma ceases to play a dominant role. This, by the way, has already led in recent years to the outflow of students with hypertrophied progressive views on the role of education and the ways of getting it from academic institutions towards professional courses and training in the company. If in the future, formal education for the current job position becomes mandatory, a person will be able to complete a master’s degree, especially since migration between related fields of knowledge is allowed in many European countries, and universal programs are specially created. On the other hand, those who will study (as an experiment) on an interdisciplinary program, will become specialists of a wide profile able to bring new ideas and technologies to the industry and be more competitive in the labour market – especially in the current conditions that require the ability to adapt quickly.

## **5 Changes in the organisation of tourism that lead to the emergence of new IT products**

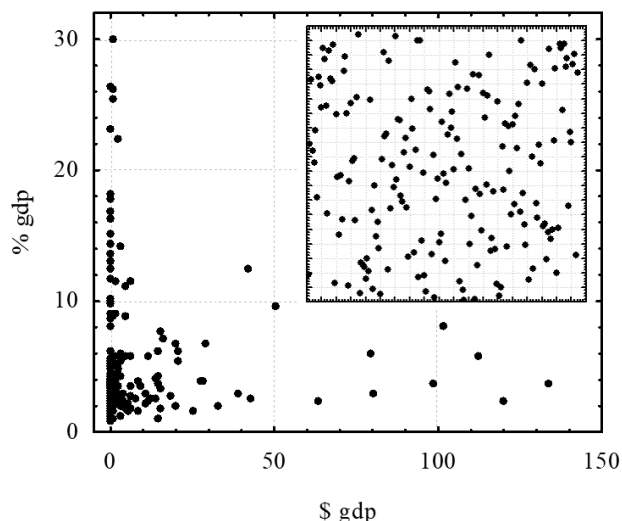
The service industries are the most prone to market changes and must meet modern requirements for service providers as much as possible. The service sector, in particular the tourism industry, and the IT sector are interconnected through the development and use of a variety of software products and online applications that support the process of creating a tourism product. The difficulty in creating specialised software for tourism is necessary to ensure the widest possible integration and synchronisation in real-time of data streams coming from different providers, which, moreover, can often be located in different geographic regions. These are all kinds of services



for booking accommodation and transport, accepting payments, including deferred payments and providing guarantees (freezing a share of funds on a client's account), insurance services – i.e. items included in a traditional basic all-inclusive package. Nevertheless, new market conditions and the transition from organised to independent tours require the connection of many third-party resources and additional services, for example: search optimisation of the information about the provider of a single recreational service among hundreds of competitors (both on the Internet and in the database of sites-aggregators), automation of communication with existing and potential clients in social networks, preparation of media content (professional photos, audio and video) for posting on their sites and third-party resources, participation in exhibitions. The receiving region must provide not only a decent level of infrastructure - for example, correlate a load of public transport with popular tourist routes, but also equip vehicles with GPS receivers, develop and implement applications for tracking traffic along the route in real-time, simplify toll payments, one-time or by subscription, for foreigners, provide for the availability of alternative modes of transport and constantly monitoring the quality of their work and the maintained level of security. Engineering framework and distribution systems also require distinctive attention – if a significant increase in drinking water and electricity consumption is planned during the peak season, then it is imperative to simulate the loading of key nodes in advance to avoid failures and accidents at a time when even a one-day stop guarantees the sharp dissatisfaction of visitors and residents (and, accordingly, the decline in the reputation of the regional authorities and the recreational potential of the tourist region in general). The burden on the healthcare system, law enforcement bodies, etc. is increasing. The superstition, that all of the above issues become relevant only in case of real massive tourist flows in any closed territory, is incorrect. This is certainly true if the situation is modelled purely on the principle of spending additional resources – it is unreasonable to build a new airport or adapt domestic legislation in the field of, for example, health insurance, or change the operating mode of national banks and cancel restrictions on foreign exchange transactions for the sake of several hundred visitors a year. National economies with the largest share of the tourism industry in GDP are not simultaneously leaders in the absolute volume of tourism revenues, therefore, it occurs sometimes that the quality of the recreational infrastructure in the most visited popular countries is unsatisfactory, despite the recreation sector priority.

But an ill-conceived, outdated basic infrastructure at the primary level (information, communication with service providers) can create a persistent negative reputation, and even worse – maintain a complete information vacuum about the destination, so that, except for a few more daring tourists-pioneers, the region will never receive the minimum number of visitors that will raise the issue of attracting investments and updating the infrastructure.

Figure 1 shows the distribution of national economies according to the degree of tourism impact on GDP (initial data for 20 leading countries are shown in Table 4) [15].



**Figure 1.** Scatterplots of the relative and absolute impact on GDP (on the internal graph, the spread is built by ranks, from 1 to 184, by the number of countries studied (1st place is the best indicator))

Excluding a few countries (out of 184 in the row), all of them are grouped within the range of up to US\$ 150 bn of the absolute income of the tourism industry (direct impact to GDP), and the maximum share of tourism products in GDP, equal to 30%.

If the distribution based on absolute income and the share of the tourism industry in GDP has certain characteristics, then the distribution based on the ordinal position on the ranking scale performs a completely disordered spread. The concentration of most of the studied national economies in the area of low absolute contribution to GDP with a more even distribution according to the percentage indicator proves that even with an increase in the volume of tourist flows, it is very difficult to obtain proportional GDP growth.

Of the 20 world leaders in terms of the relative contribution of tourism to GDP, only Macau and the Philippines were also included in the list of leaders in absolute terms (table 4). Moreover, in Macau, the tourism industry forms more than 50% of the national economy GDP, in the Philippines – more than 40%. Therefore, countries do not try to make the tourism industry an explicit priority and do not abandon the production of other goods and services, except, of course, those whose physical area and/or geographic location limits diversification. In the United States, Germany, China and Japan, tourism brings less than 3% of GDP, although in absolute terms the average figures for 2017–2019 were the highest in the world. Many researchers call tourism one of the most profitable sectors of the global economy but do not specify that there is a limit to income growth per unit of territory. The physical recreational capacity of the host region is limited, so traditional tourism based on physical site visits has rather tight growth margins. The territory of Macau is only about 30.8 km<sup>2</sup> (for comparison, the area of Kyiv city is about 825 km<sup>2</sup> [21]).

**Table 4.** Direct Travel & Tourism impact to GDP, selected countries (calculated as average for 2017–2019)

Rank by absolute GDP impact	Country	2017-2019 average,\$US bn	Rank by relative GDP impact	% of T&T in GDP	Rank by relative GDP impact	Country	% of T&T in GDP	2017-2019 average,\$US bn	Rank by absolute GDP impact
1	United States	603.739	107	2.89	1	Macau	50.59	27.477	19
2	China	364.971	114	2.75	2	Aruba	29.91	0.861	109
3	Germany	134.025	87	3.53	3	British Virgin Islands	26.27	0.246	153
4	Japan	120.159	131	2.37	4	US Virgin Islands	26.18	1.053	104
5	Italy	112.268	50	5.64	5	Maldives	25.31	1.341	96
6	Mexico	101.623	36	8.08	6	Former Netherlands Antilles	23.06	0.734	118
7	France	98.618	81	3.71	7	Bahamas	22.33	2.947	72
8	United Kingdom	80.660	106	2.90	8	Grenada	18.03	0.219	155
9	Spain	79.563	45	5.87	9	Seychelles	17.76	0.279	149
10	India	63.461	132	2.37	10	St Lucia	16.69	0.488	134
11	Thailand	50.692	28	9.61	11	Anguilla	16.14	0.060	175
12	Brazil	43.401	129	2.41	12	Vanuatu	15.01	0.137	167
13	Philippines	42.286	19	12.44	13	Antigua and Barbuda	14.36	0.469	135
14	Australia	39.693	104	2.92	14	Cambodia	14.04	3.552	61
15	Canada	33.155	151	1.95	15	Dominica	13.63	0.073	173
16	Austria	29.084	40	6.66	16	Belize	13.01	0.243	154
17	Saudi Arabia	28.735	76	3.84	17	Cape Verde	12.97	0.247	152
18	Turkey	27.795	80	3.73	18	Sao Tome and Principe	12.46	0.057	177
19	Macau	27.477	1	50.59	19	Philippines	12.44	42.286	13
20	Russian Federation	25.323	170	1.52	20	Barbados	11.64	0.557	129

On the contrary, financial services, which Macau also specialises in, can be provided without the physical presence of the buyer; many transactions, especially trading in the stock markets, are conducted online. Therefore, this industry has almost unlimited growth, since the volume of generated final services does not depend on the area of the state territory. The essential difference exists between traditional types of tourism and other spheres of non-material production: the hard threshold of recreational capacity. If the software product (source code, file, etc.) is generated once and can be copied an infinite number of times, then the number of visitors can be increased solely based on the physical bandwidth of the destination. Countries that planned tourism revenues as a key factor in GDP growth did not always correctly assess recreational capacity. The virtualisation of travel services partially solves this problem, but not every traveller will agree to replace real impressions with artificial ones. Therefore, IT innovations in tourism based on “recreation without leaving home” are more of an auxiliary factor, rather than the main one (except for periods of isolation, as 2020 showed). But the virtual market is gradually growing and becomes difficult to be assessed correctly. Revenues from online events are recorded for a completely different type of economic activity, and it is possible to differentiate them according to the final consumption only using the data of the smallest sta-

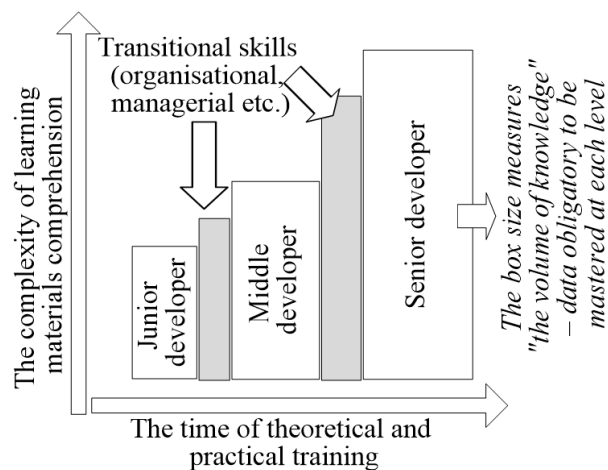
tistical unit – the company providing these services. That is, on the scale of the regional (even more difficult – national) economy, the income from virtual reality is estimated either purely empirically, or grounded at selective additional reporting of basic suppliers, which again raises the problem of building a reliable system of satellite accounts.

It would be wrong to say that organised tourism is rapidly becoming obsolete and the future is solely for individual travel. Large multinational companies will not just give up the high profits obtained, in fact, due to one-time large investments and subsequently repeated exploitation of almost durable resources, with a fairly simple business model and well-proven technological operations. They are now at the stage of transformation and testing of innovative technologies; even within the 2020 lockdown, many service establishments continued to operate. Those who manage to hold out until the restrictions on physical movement are lifted will benefit from the deferred demand effect. Fundamental changes in the global economic system led to the bankruptcy of thousands of tourism service providers operating according to the traditional scheme, but at the same time stimulated the implementation of innovations and the search for new forms of interaction with consumers in the context of the breakdown of the classic tourism organisation scheme. Those companies that were

ahead of the curve not only saved profits and customers but, on the contrary, were able to get premium due to the virtual absence of competitors in the first periods of the industry lockdown. Cultural and leisure institutions that have already introduced virtual reality tours, digital information products, online access to their resources based on a considered (rational according to the consumer's opinion) and secure (taking into account the latest trends in ensuring the security of financial transactions) payment system have received an unprecedented flow of customers. The same can be attributed to the field of blogging and all kinds of training courses, which significantly increased the client base in record time in the conditions of information deprivation. On the one hand, there was a demand for new professions, together with a noticeable lack of specialists; short-term online training programs were massively created (unfortunately, not always by competent market participants) for the increasing demands of people who decided to change their field of activity. The relationship between the needs dictated by the tourism industry and IT developments has reached its zenith today.

It is logical to assume that a graduate of the Tourism speciality should have an idea of all the presented areas in general terms (at the level of understanding the mechanisms of interaction between suppliers of products at the stage of intermediate consumption, or the B2B segment), and ideally have practical skills in one of them almost at the level of a related profession representative (for example, be able to plan and implement SEO or draw up complete business plans using international financial standards). Unfortunately, this is very difficult to implement in the context of curricula formalisation of both specialities. Several selective disciplines of an introductory scope are not enough, and taking into account the normative reduction in the amount of classroom time on the minimum principle, it is almost impossible to supplement curricula to save funds for state universities in Ukraine. The current Methodological Recommendations for the implementation of ECTS in universities (the Order of the Ministry of Education and Science of Ukraine No. 1/9-119 of 02.26.2010) limits the number of classroom hours both per week and in terms of the total credits in the curriculum. The maximum of the allowed limit is very difficult to reach. For example, no more than 18 hours are allotted per week for master's training (an academic hour of 45 minutes is used, not the usual astronomical one). Theoretically, this limitation can be circumvented, but this procedure is rather complicated and expensive for educational institutions, therefore, state universities are forced to work exclusively within the Recommendations framework.

The situation in Bulgaria is somewhat better, although there are issues that would be better solved autonomously, at the level of universities, and not the Ministry of Education and Science (for example, the registration of foreign students, agreements concerning foreign practical studies, which is especially important for training in international tourism).



**Figure 2.** The “time–complexity” scale

## 6 The tasks of the national education system and inclusive learning arising in response to global market challenges

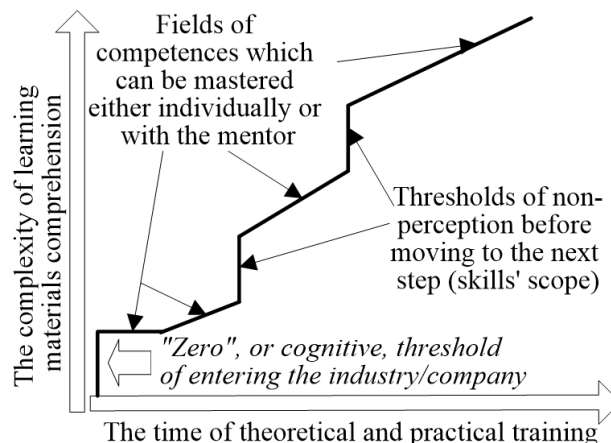
All these emerging tasks require the creation of new educational programs, which are increasingly acquiring the interdisciplinary character and, unfortunately, are rapidly becoming obsolete. This is due to the rapid updating of the IT solutions functionality used by travel companies. If we take an average training cycle of 3–4 years (at the college and university bachelor's level), adding another six months for mastering real skills in the workplace (we are talking about the development of competencies that allow a graduate to analyse the current situation within the external and internal environment of the company, to predict event scenarios and make managerial decisions – such skills are very difficult to acquire for a student who combines work with study), then we get on average 4–5 years for high-quality training of a specialist in the service sector. At the same time, the average speed of updating versions of popular programs is 2–3 times a year. It turns out that the basic course of HEIs, even with dual education, is not initially ready to prepare for the labour market an employee, who masters the most modern software products (except those studied in the last year). Obviously, a future specialist gets an understanding of the fundamental principles of the functioning of a certain area in academic classes, but he loses significantly to an employee who studies from scratch in the workplace. When planning curricula at the level of government agencies responsible for the development of a holistic concept of higher education (while not forgetting about school education, which is basic for complex personality development and the acquisition of cognitive functions), one should take into account the ratio between the amount of knowledge and skills required for start in a certain profession, and the speed of their assimilation (figure 2).

In programming, the approximate workers' classification includes three stages: the junior, middle and senior developer. These proficiency levels can not be reached simply by building up the knowledge in a particular field



– there are so-called “grey” transition skills and competences, which should be accelerated. They include communication, managerial, organisational, linguistic and many other skills, that are out of the pure programming box, so a worker is usually not able to study them individually. Also, moving up the ICT career predisposes widening the spectrum of languages and technologies a person must know. It is the process of constant recirculation between different levels (perfect C knowledge will not substitute initial JavaScript skills if you do not know the syntax at all). IT demands on-going education and retraining. Indirectly, this process involves the end users of software products who need to adapt to new versions.

Despite breakthrough innovations in the natural sciences and the use of the latest equipment for research (at least in developed countries), it is impossible to prepare a practitioner capable of posing and solving complex problems in the field of biology, physics, chemistry in 2–3 years. And the formation of a scientific school requires at least 10–15 years. Unfortunately, this process cannot be accelerated even with increased funding. The training period for practising specialists (taking into account the minimum period of accumulation of experience and adaptation in real working conditions after confirmation of formal education) in the field of medicine and some other areas of knowledge, mistakes of which can threaten the safety of human life or national security, is also 10–15 years on average. It should be taken for granted that in a certain list of professions, the minimum accumulated experience is a decisive factor, and the return on investment in a specialist will not be obtained immediately. The modern market is now set for the shortest possible pay-back period. Over the past few decades, almost all countries – both developed and developing – have gone through a period of priority for “fast” specialities and sectors of the national economy. In each area, employers empirically build the rank of professions/positions/set of qualifications depending on the rate of theoretical knowledge accumulation and the transition to their practical implementation. Wages at the lowest level are cheaper, in most cases, only a minimum training period is needed, often limited to on-the-job instruction – and neither the company nor the state through the system of financing scholarship programs wants to train specialists of higher qualifications, or they train them in a minimum quantity, for specific positions. Of course, there are job positions with minimal requirements, but managers commit a big mistake if refusing to encourage employees to learn and advance higher, regardless of their age. The innovative potential of a company directly depends on the level of erudition (this is paramount since it is impossible to improve qualifications without understanding why it is needed and in what direction in general) and the qualifications of personnel. Saving now can lead to lost profits (worse, if real money losses) in the future. But even if the policy of in-house training is supported in every possible way, some type of knowledge and skills always exist that can only be obtained from the outside – by exchanging experience with another company or formally training at the academic institution. The cumulative growth of knowledge of an in-



**Figure 3.** The thresholds of perception

dividual employee (or a university student) can be represented as a broken curve, very close to the previous graph (figure 3).

When a person just enters a new branch of knowledge/communication environment, the first threshold that he/she needs to overcome is cognitive immunity (“cognitive non-perception”). It is necessary to adapt the way of communication and perception of information for specific conditions, and if desired, it can be overcome individually or in an even shorter time – with the help of a coach or mentor. The first-year student or new employee then learns from the environment within the company (in terms of biology, the mini-habitat). After a few weeks or months, he/she has already been prepared, perfectly fulfils the current routine tasks and is ready to move on, expand the so-called comfort zone. Then the next threshold of non-perception appear, which cannot be overcome without acquiring professional knowledge, time to practice the new skills in practice and professional mentoring. Bypassing this threshold without the above-mentioned mandatory conditions (for example, an employee gets a higher position or expansion in the range of responsibilities for which he/she is not ready either morally or in terms of the totality of knowledge and skills) inevitably causes psychological discomfort between this person and colleagues who do not want to accept an obviously weak player into their team. In addition to improperly fulfilling new responsibilities, this employee simply cannot see new prospects for the company and options for introducing innovations and mires in routine work. Likewise, an industry, for which the labour market offers exclusively low and middle-level specialists, fails to find reserves for development. Experienced employees have learned how to quickly identify and solve current problems and maximally simplified current operations. The ability to think strategically, use an interdisciplinary approach is also a kind of skill, consisting of many competencies that cannot be formed below a certain level. Our study does not cover the psychological aspects and methods of motivation within the framework of this process, we state the result in the economic plane: the development of the company and the industry in gen-

**Table 5.** Financing the national education system

Main indicators	Bulgaria	Ukraine
Government expenditure on education, total (% of government expenditure)	12,73	13,05
Expenditure on tertiary education (% of government expenditure on education)	15,92 <sup>1</sup>	24,99
Government expenditure per student, primary (% of GDP per capita)	23,00 <sup>1</sup>	30,32
Government expenditure per student, tertiary (% of GDP per capita)	16,60 <sup>1</sup>	34,46
Literacy rate, adult total (% of people ages 15 and above)	98,35 <sup>2</sup>	99,97 <sup>3</sup>

2017 latest data, excluding <sup>1</sup>: 2013; <sup>2</sup>: 2011; <sup>3</sup>: 2012

eral, of the national economy as a set of industries based on the accumulation of knowledge and skills that stimulate the search for innovation, cannot be carried out without investment in intellectual capital and human resources. You can learn how to make perfect copies of business processes, but building the entire system of national education and production according to a franchise scheme is a pre-approved lagging strategy. When adopting a strategy of continuous development, in addition to the initial investment in knowledge accumulation, it is necessary to budget for the losses from bad experiences and failure of innovations. The latter is often the decisive prohibitive criterion for the leaders of organisations and government agencies who decide to stop at a certain level of personnel development.

Losses for the state are not measured solely in material funds – these are social problems associated with unemployment of specialists whose skill level is high for the local market, or the need for a profession which will appear only in a few years, scientific projects that have not justified themselves, or support for unprofitable industries that lower their reputation for the international market, etc. According to the World Bank report [22], Ukraine occupies a leading position by the relative volume of higher education financing. But this indicator is further adjusted by the so-called “criterion of functionality” – the quality of the formal knowledge obtained and the ability to apply it in practice, i.e. get a job in a relevant speciality. The unfavourable situation in the labour market, as experts say, indicates the inefficiency of the education system, its inadequacy to market conditions. Table 5 shows the comparative characteristics of financial and some other indicators of Ukraine and Bulgaria [16].

Ukraine and Bulgaria spend about 13% of all government expenditure on education (mainly financing state educational institutions), but this amount is unevenly distributed further, between education levels. Bulgaria allocates only 16% of the budget for the tertiary education system when Ukraine spends 25% on HEIs. Accordingly, the unit costs per pupil (student) in Ukraine are 1.5–2 times

higher than in Bulgaria. Nevertheless, as indicated earlier in table 2, both countries possess a very high literacy level of the population (in Bulgaria it is lower due to the part of migrating national minorities). On the other hand, having such high, in comparison with the world average, indicators of education, neither Bulgaria nor Ukraine provide data on the total population coverage with higher education, by various grades. Rather, such information can be obtained from the census data (which, according to the UN methodology, are carried out every 10 years and in 2020, of course, were suspended), specialised reports or national statistics services. The latter source is the most reliable, but if the indicators are not reflected in international statistical databases, then they are invisible to foreign experts who are used to focusing primarily on the world ratings, compiled by reputed international organisations. According to Ukrainian sources, in 2016-2018, the share of the country’s population with a complete higher education (i.e., master’s level and above) was about 30% [22, 23], but these data were not displayed in the statistics of the World Bank, UNESCO or other international databases. Only Bulgaria in 2017 showed that about 24.7% of the population has a higher education at least of bachelor’s level.

However, neither Ukraine nor Bulgaria was included in the popular ratings compiled by Index Mundi [24]. The reason, among other things, is the different approach to the classification of qualifications. In Ukraine, a bachelor’s degree is traditionally not quoted among employers, and there is still no clarity in national legislation whether this level can be considered a complete higher education or the latter needs exclusively a master’s level. The Law of Ukraine “On Higher Education” in the latest edition does not use the division into “basic” (bachelor) and “higher” (specialist, master) education at all, instead of distinguishing the first, second and third levels (bachelor, master, doctor of philosophy) – the grades common in most countries of the world. But the national statistical system has not yet fully switched to new standards, and the annual data on the number of university graduates are calculated without exact division by levels. Primary data are submitted by educational institutions and are closed to external users. The migration of the working-age population, which had sharply intensified in the last decade and was suspended by the lockdown, distorts the official census data since a complete socio-demographic cut is usually not carried out annually – this is too expensive and is not required for medium-term planning. In countries that massively accept unskilled labour from abroad, it is necessary to clarify the proportion of which population is taken into account when determining the level of education – exclusively citizens or temporary residents. Thus, it is difficult to obtain accurate data for comparing the effectiveness of higher education in different countries, and we would suggest introducing an additional adjustment factor for countries with a high proportion of foreign students (respectively, developed infrastructure of the education sector). Nevertheless, world practice separately measures the proportion of the population with the education of various levels, focusing on their stratification, and the generated ratings can affect the

state's reputation in the system of global economic relations. More than that, the list of leading countries in terms of education levels does not coincide, although it would be logical to assume that a sufficient infrastructure for obtaining a bachelor's degree may predispose the local population to continue their studies – but this hypothesis is not confirmed.

Educational attainment, top 20 national economies (population 25+, cumulative total, %), is as follows [24, based on 2015-2018 data]:

- at least Bachelor's or equivalent (within the list of 107 countries) – United Arab Emirates (46,56%), Switzerland (36,95%), United States (34,99%), Belgium (34,69%), Lithuania (34,54%), Georgia (34,02%), United Kingdom (33,92%), Israel (33,21%), Denmark (32,36%), Australia (31,75); Singapore (31,6%), Ireland (31,16%), Netherlands (31,09%), Latvia (30,03%), Cayman Islands (29,86%), Korea (28,68%), Cyprus (28,56%), New Zealand (28,1%), Norway (28,07%), Saudi Arabia (25,98%);
- at least Master's or equivalent (out of 99 countries) – Georgia (26,16%), Switzerland (23,78%), Slovak Republic (17,59%), Czech Republic (17,53%), Belgium (16,87%), Tajikistan (15,58%), Poland (15,52%), Kyrgyz Republic (14,18%), Denmark (12,97%), Netherlands (12,9%), Slovenia (12,86%), United States (12,84%), Albania (12,82%), Spain (12,81%), Peru (12,75%), Israel (12,2%), Austria (12,11%), Cyprus (12,02%), United Kingdom (11,97%), Germany (11,94%);
- doctoral or equivalent (among 85 countries) – Switzerland (2,93%), Slovenia (2,76%), United States (2,03%), Israel (1,44%), Germany (1,25%), Sweden (1,24%), Finland (1,14%), Australia (1,14%), Latvia (1,11%), Norway (1,02%), United Kingdom (1%), Ireland (0,99%), New Zealand (0,94%), Austria (0,94%), Puerto Rico (0,93%), France (0,84%), Cayman Islands (0,81%), Denmark (0,78%), Korea (0,77%), Cyprus (0,76%).

Only Cyprus, Denmark, Israel, Switzerland, the United Kingdom and the United States repeat in all three lists; this proves the continuity of the higher education cycles. In other countries, residents either stop at the bachelor's or master's level, and only a few proceed with the highest grade (to note, the Doctor of Science, actually the highest level, is not measured), or the population is roughly divided into two groups – those who graduate with the highest degree (at least master's) and the others not enrolled by higher education at all.

## 7 Conclusions

1. During periods of economic recession, each state faces the problem of redistributing budget funding in favour of the most profitable industries in the short run, to generate the required amount of foreign exchange earnings to avoid default. However, as the experience of many European countries demonstrates, ignoring the needs of the education sector,

especially higher education, leads to social tension and a lack of motivation for effective work, which is especially important for young people.

2. Based on real statistical data, a contradiction between the postulate of the return growth on labour and an increase in the share of the working-age population with higher education is shown, explanations for this paradox are proposed, and it is noted that this problem arises in countries with high per capita income.
3. The tourism industry is starting to rely heavily on IT for professional applications, to support the basic workflow creating a package of services. For the coordinated work of enterprises of the two branches at the stage of intersectoral consumption, it is necessary to ensure the integration of curricula and apply an interdisciplinary approach in training specialists for the tourism industry, who must be proficient in information technology at an advanced level. Otherwise, the management system at travel companies will slow down the development of innovations.
4. Bulgaria and Ukraine have many common trends in the IT sector development, including the export earnings of IT products through outsourcing. Today Bulgaria is the leader in the field of tourism, Ukraine has a higher potential in the field of computer science and programming. Also, the studied countries have a different structure of tourist flows, which requires HEIs, which train professionals for the tourism industry, to have different content of educational programs.
5. In both Bulgaria and Ukraine, the intellectual potential in the IT sector works primarily for foreign markets, which deprives the local recreational infrastructure of reliable solutions developed based on regional specifics, in particular, restrictions on access to more expensive equipment, standard for developed countries.
6. The tendencies of using more expensive and high-quality labour force to perform complex tasks in the IT sector may become a favourable incentive for technical universities in Bulgaria and Ukraine to train specialists and create more dual training programs, which, in turn, will stimulate employing companies to attract university graduates.
7. The service sector (within individual products and entire industries) is suggested to be divided into 1) a group with marginal reserves for creating added value per unit of resource, and 2) a group in which the growth potential is based on the duplication model of a single created product and therefore is limited only by the capacity of potential demand. Virtual travel services belong to the first group, while traditional recreational methods – to the second, and therefore the share of the tourism industry in GDP of many countries is insignificant.



8. The process of building new teaching methods and techniques must necessarily date back to psychophysiological and social factors, the threshold of cognitive perception and motivation in mastering knowledge in innovative ways is especially important. In any branch of knowledge, there will remain areas that are amenable only to traditional formats, but their number is gradually decreasing – not due to technology development in general, but through the introduction of new means of interpersonal communication. The latter is the basis for overcoming restraining factors.

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## Content substantiation of the regional advanced training educational program “Kaizen Technology”

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**Abstract.** The relevance of the article is related to the need to modernize school education in Ukraine in the context of reform on the basis of the best world standards and models. The purpose of the article is to reveal the essence of Kaizen technology in secondary education, to substantiate the content of the regional educational program of teachers' professional development on this basis. The research methods are theoretical analysis, synthesis, modeling, systematization, generalization and survey. The results of the research are following: the essence of the possibilities of Kaizen technology in secondary education is revealed, the complex of approaches to the program content development is determined and its content is substantiated. There are three modules such as “The essence and origins of Kaizen technology”, “Lean-education”, “Management in education based on Kaizen technology”. Conclusions: Kaizen technology is a long-term strategy of personal development, based on the creativity of the teacher; mastery of Kaizen is carried out in three stages; the updated content of teacher advanced training is based on a set of scientific approaches; the criterion for the effectiveness of Kaizen technology and its purpose is the professional readiness of teachers for creative and constructive professional activity and continuous self-development.

### 1 Introduction

The relevance of our article is due to the following:

1. In the concept of pedagogical education of Ukraine development in 2018 [1] among the obstacles to creating a quality system of teacher training and professional development it was mentioned “... the problems of combining in the preparation program of the chosen subject specialty mastering with aspects of its teaching, and also with taken into consideration the interdisciplinary links; and insufficient awareness of the teacher with the research methods at the level of their responsibilities or lack of appreciation of its necessity” [1]. It is determined that the factors that led to this are “outdated content, structure, standards and methods (technologies) of teaching in the system of pedagogical education, which do not provide would-be teachers with the opportunity to master the competency approach and modern effective tools of pedagogical work” [1]. Therefore, one of the ways to solve this problem is to form the teacher's competence in the use of Kaizen in the educational process, and this will promote both

self-development of teachers and children's creativity. It is new, but is not implemented in the practice of Ukrainian higher pedagogical education institutions and institutions of continuous pedagogical education.

2. The current state of education and science in Ukraine requires from teachers the creativity in the education, which involves the child's personality in creative and constructive activities. Creativity is a condition for the development of society and meeting the growing needs of people. Without creativity, the society would still live in the caves if people solved problems only on the basis of reproduction. There are many methods of developing the creativity of children and adults. These include problem-based learning, which involves the teacher creating problem-solving situations in teaching process and solving them; the technology of solving inventive problems, which relates mainly to the technical education; the concept of intercultural dialogue, which applies to more humanities; the concept of activating the students education process, which contributes to the formation of positive motivation for learning and cognitive activity and children independence in learning; V. Davydov, L. Zankov de-

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velopmental training, which are designed mainly for primary school, etc.

The question arises about the presence in education of such learning technology, which would apply to all disciplines and children of different ages, and the teachers at the same time. Kaizen technology meets these requirements, but it is not known in Ukraine in education. We conducted an oral survey of postgraduate students at H. S. Skovoroda Kharkiv National Pedagogical University (KhNPU), and at Ternopil Volodymyr Hnatiuk National Pedagogical University (TNPU). A total of 234 people testified that only 7 people out of 234 (3%) heard this term, but they cannot explain it and cannot use it in the educational process. They have heard it mainly in terms of the efficiency of Toyota workers. However, most respondents are interested in learning about this technology and its capabilities and would like to learn how to use it in the educational process (96%). This indicates the readiness in teachers for professional self-development. Moreover, military education institutions have become interested in Kaizen technology. And these are the institutions where the executive thinking is traditionally formed along with the formation of responsibility and initiative in fulfilling the set tasks. We interviewed the scientific-pedagogical employees of the Departments of Pedagogy and Psychology, and the social and humanities studies of the National Academy of the National Guard of Ukraine – whether they know about this technology and want to learn how to use it. More than half (57%) of all surveyed teachers of these departments were interested in it. But none of them had heard of her before. Teachers of economics from all these higher education institutions know about Kaizen as a technology of lean and inventive production, staff development in Japan, but do not know whether it can be used in the education of teachers and children. Thus, Kaizen technology has significant opportunities in the modernization of pedagogical and not only pedagogical education in Ukraine, there is a motivation of teachers to master it and implement it in the educational process.

3. The work of educational institutions is being reformed, including through the use of innovative technologies in the educational process. The concept of the New Ukrainian School states that “A powerful state and a competitive economy will be ensured by a cohesive community of creative people, responsible, active and enterprising citizens. Such citizens should be prepared by the secondary school of Ukraine” [2]. Today’s requirement for the organization of the educational process in higher education institutions is to change all components that determine the state of the educational process of educational institutions, as well as to identify specific forms and methods of its organization, to create appropriate training facilities, which means updating educational programs as well as their mod-

ernization. Currently, the informatization of the educational process means changing the entire educational system, its focus on a new information culture, increasing the availability of quality education through the development of distance learning and information support of the educational process with modern information and telecommunications technologies [3]. One of the possible ways to solve these problems is the implementation of Kaizen technology in the advanced training of teachers and scientific-pedagogical employees.

4. We conducted a content-analysis of the educational programs of the would-be teachers, social educators in KhNPU, Donbas State Pedagogical University (DSPU), TNPU. The term “Kaizen” is missing in them. Accordingly, the programs of the pedagogical employees advanced training in the postgraduate education institutes of Ukraine were further revised. Also, this technology was not used for the teachers. While managers, polygraphers of different countries use this technology to improve the skills of already working people, to train personnel and managers for the industry and large enterprises, there are even centers for advanced training in enterprises based on this technology [4–6]. The Kaizen Institute has been working since 1985, but in Ukraine it has been existing since 2017. The Kaizen Institute offers certified programs of three levels for practitioners, managers and trainers [7]. There is a choice of programs for certain positions and the programs with a certain result [8]. But their content is not disclosed on the website. The programs work in the workplace at the enterprises. Also, the Kaizen Institute in Ukraine annually organizes the All-Ukrainian Kaizen Conference, which is an excellent platform for cooperation for owners and managers of companies, the heads department, HR-managers and specialists in innovation and continuous improvement [9]. The advantage of this Institute is that it is the original source and original provider of Kaizen in Ukraine. It (Institute) supports companies of all sizes from all market segments, providing them a stable competitive advantage. This means that Kaizen is common, can be applied to professionals in various fields of work and management, trainers – and therefore to teachers.

The existing Kaizen Centre in Russia [10] offers Kaizen training for lean production. There is a free trial program of three distance training sessions, which relates to production. There are on-site topics and content of open and corporate thematic trainings and seminars, quests on the problem of production and campaigns. But all this process does not apply to teachers and the theory of learning, their work with children and students. At the same time, we did not find in public access the advanced training programs of teachers based on this technology. Therefore, the development of such a program by taking into account the essence and philosophy of Kaizen is



an important step in the development of andragogy and theory of pedagogy, and in the implementation of the advanced pedagogical experience in education in Ukraine, by joining the Ukrainian education to the world education.

5. Kaizen technology (from the Japanese words: *kai* – change and *zen* – good) involves the desire to improve at every stage of personal development, which is confirmed by the opinion of I. Masaaki, Kaizen relies on gradual progress [11]. As R. Maurer points out, Kaizen is a way to achieve complex goals and achieve great change. The essence of Kaizen is that you need to go to the goal in very small but progressive steps, because small steps lead to big changes [12]. This corresponds to the didactic principle of systematization and systematicity in teaching process, the combination of science and accessibility, the connection of theory with practice. But how to do it on the basis of this technology still needs to be justified in relation to teachers. There is a practice of learning based on Kaizen technology in Ukraine [13] – Kaizen as an alternative learning that involves learning English on its basis, children’s project activities and their creativity. Such training involves the children purposefulness, their planning of their activities and projects, independence in creativity, passion for learning, distance learning from the first grade, the formation of learning and general competencies, self-diagnosis of their interests and their implementation in projects, connection of children’s projects with real practice, individual work with children, and the school’s relationship with parents related with the interests of children [13]. But there is no theoretical substantiation of Kaizen technology in pedagogical theory today. As for teachers, it is valuable not only to use Kaizen technology working with children, but also to apply it to themselves, which is manifested in the attitude of thinking to the development, but not to the given [14]. This is what makes Kaizen technology modern and necessary.

Theoretical analysis of the Kaizen technology use and introduction in the world process of teacher training and the mastery of creative and constructive types of pedagogical activity by them allows us to state that it has been studied in different directions. Thus, M. Colenso proved the Kaizen feasibility for successful organizational changes and R. Maurer studied the method of Kaizen, its psychology and gave recommendations for its implementation in the individual life [12, 15]. I. Masaaki formulated the Kaizen philosophy, where Kaizen is the key to success [11]. Kaizen is revealed in the teaching of creative thinking of adult employees [15]. Researchers also studied such following issues as the use of Kaizen technology in the creative and constructive activities of teachers, which is designed to form a creative person, who is consistently creative and logical thinking, developed, able to produce creative ideas and gradually able to create the final product of his/her work [4]; the effectiveness of the

use of innovation-oriented professional environment and the Kaizen philosophy implementation in the education of future professionals, and this will ensure the transition from knowledge of facts to the development of competencies and improve the quality of educational activities of higher education establishment [16]; and Kaizen technology implementation as a systematic method of creating, applying and defining the whole process of teaching and learning, considering all educational resources and their interaction. It is proved that Kaizen technology optimizes the forms of education, develops the creativity of both students and teachers [17]; of Kaizen technology use in self-development and professional growth of teachers, formation of new pedagogical competencies, creation of methodical resources for introduction of technologies of creative development [1]; of Kaizen implementation as a comprehensive management concept and as a philosophy of continuous improvement within the team, to implement corporate culture and management decisions that encourage employees to constantly offer improvements and implement them in the daily work [18]; of increasing the efficiency of educational and business management through the introduction of Kaizen technology, which has a positive impact on the process of implementation and management of innovations, significantly increases its level [1], and the practitioners have proven the effectiveness of Kaizen technology at Toyota production [19]; of Kaizen technology application in the field of health care and medical workers education, which leads to the improvement of human health and the work of medical staff.

## 2 Purpose and objectives of the research

Given the above, we can formulate the purpose of the article – to justify and formulate the content of the educational regional program “Kaizen Technology” for teachers. The objectives of the article are:

- 1) “Kaizen technology” concept concretization and disclosure within the teacher training,
- 2) scientific-theoretical substantiation and disclosure of the content of the advanced training regional educational program of “Kaizen technology” pedagogical employees and recommendations for its teaching.

### 2.1 Research materials and methodology

The materials for the study we selected were:

1. Research on the innovative technologies’ application in the process of training and retraining of teachers [20–23]. These works revealed the basis for the introduction of innovations, showed the technologies and conditions of their implementation, revealed the concept of technology.
2. Kaizen technology was also analyzed as an innovative technology for improving personality and lifestyle and thinking, aimed at constructive action, through the use of internal resources and creativity

[24]. We relied on the advantages of Kaizen technology in the teachers training, such as: the development of social experience, basic social roles; formation of readiness for creativity in the professional activity according to the revealed own interests, individual features and abilities, formation and development of knowledge, attitudes, personal landmarks and norms of creative and constructive interaction, self diagnosis by teachers of the interests, realization of project activity in training, aspiration to constant daily improvement and focus on the quality of the learning process [1, 9, 24]. We also relied on the key principles of Kaizen philosophy that H. James Harrington singles out: continuous change; open recognition of problems; promotion of openness; creation of work teams; project management with the help of cross-functional teams; development of self-discipline; self-improvement; informing each employee; delegation of authority to each employee; elimination of the root cause and prevention of recurrences; embedding quality in the process; standardization [12]. The organization of training on these principles provides trainings, counseling and work in small groups (teams). Kaizen technology is a technology of progressive and continuous improvement of personality, and is based on a comprehensive concept that encompasses philosophy, lean-education, theory and management tools [19]. In pedagogy, that organizes the process of learning something new, it is also acceptable. Thus, there is a practice of introducing lean-education in Norway, and it has given good results [25]. Lean-education at this school was aimed at performing the following tasks, after teachers have studied its experience at the Toyota Company:

- (a) To improve student learning outcomes. To give to the students more time to learn and to the teachers more time to teach, and to improve the quality of training.
- (b) To improve the working environment for teachers.
- (c) To create a more attractive work environment at school and eliminate what reduces their most time in classroom management [24].

Both teachers and students were involved in these processes. This means the need to take into account the theory of children's participation in their problems solving and training teachers to work under such principles, and in training time management implementation. Nowadays, Berland Elementary School focuses on three line practices:

- (a) Workplace organization according to the "5S" methodology.
- (b) Continuous improvement.
- (c) Standardization of the best way of teaching. This indicates a constant exchange of best practices and learning from experience,

which implements an androgynous approach in teacher training. We also considered research on different approaches.

Among them, there are the competency approach as a basis for education reformation in Ukraine; acmeological approach to the education as a basis for self-development and self-realization; the androgynous approach as a basis for adult learning, child-centeredness as a philosophy of modern education in Ukraine; the systemic approach as a basis for "Teacher-child" "Teachers-parents" and "Teachers-teachers" interaction; the creative and constructive approach to educational activities; synergetic approach as a basis for self-organization of learning; the personality-oriented approach as a basis for taking into account personal interests; creative approach to educational training, requirements of secondary education reform in Ukraine teacher training [2, 26–31]. These researches revealed the guidelines, principles, directions, forms and methods of teacher training under modern conditions, which is important for the introduction of Kaizen technology in postgraduate teacher training. It shows the possibility of its implementation in the New Ukrainian School based on consonance of ideas.

At our research we used such methods of scientific and pedagogical research as concretization, generalization, theoretical analysis of sources, content analysis of programs, synthesis, induction, deduction, modeling, survey.

### 3 Research results and their discussion

On conducting the scientific research, we specified the category "Kaizen technology" as a complex procedural component of the educational process, which aims to study and assimilate knowledge, achieve the goal in the process of creative interaction and find a constructive solution to professional issues. It forms a creative, constructive and mobile skilled specialist with motivated for continuous self-improvement in the professional sphere. In general, Kaizen technology is a system of personal development, and implies a systematic improvement in all spheres of human life such as professional, social and personal. This technology is also common for all and applies to all parts of the educational process: teaching, education, management of educational institutions. It is personality-oriented, takes into account the experience and interests, human aspirations, and teaches daily creativity in life and professional activities, to self-development and lifelong learning by improving the experience of their own professional activities. It becomes a way of life, thinking and thus contributes to the development of personality in everyday life and improve the conditions of work and life. Kaizen technology is a long-term strategy for the individual development and improvement, with certain goals and uses in the process of achieving them the creative potential of the individual. Individual improvement is impossible without

creativity or the ability to create (creativity), a creative approach, professional activity and creativity, so it is logical that Kaizen technology is based on creativity. Creativity itself is a productive human activity capable of generating qualitatively new material and spiritual values of social significance. Its basis is the development in teachers of diverse, deep and strong systems of knowledge, maximum stimulation of independent activity, development of sustainable creative interests task execution time [18].

In addition, creativity is a certain ability for creativity and it is considered a special quality of personality. According to E. Torrens, creativity is a common feature of personality and affects creative productivity regardless of the sphere of personal activity [32]. That is why the Kaizen technology implementation in the teachers training process promotes the creativity of participants in the training process and develops creativity and the ability to creative and constructive interaction both with teachers and with their students. Thus, the theoretical basis of Kaizen technology as an educational technology is a creative and constructive approach to educational activities, and is characterized by: the formation of training goals and objectives, based on the basic skills of the individual; the goals are different in perspective and term; positive interaction and separation from the training material of personally significant elements that will stimulate creative thinking; regulation of the author's creative and constructive position on solving professional tasks; formation of positive experience in the implementation of creative and constructive actions in professional pedagogical activities [12, 18, 33]. The purpose of Kaizen technology as an educational technology is realized in the process of achieving a system of following tasks in education: providing conditions for person self-actualization and self-realization, using modern forms and methods of teaching; realization of creative potential of personality; mastering the techniques of constructive thinking; and readiness for creative and constructive professional activity.

Formation of creative and constructive interaction on the technology of Kaizen in teachers advanced training should consist of three stages: information-theoretical; reconstructive and creative; creatively representative. Each of these stages corresponds to a certain stage of the educational process. It has its own purpose and objectives and is carried out by certain forms, methods, tools and resources. It should be mentioned that the original Kaizen technology training of employees in the workplace is carried out in five steps, gradually and progressively. The first step is introduction to the problem. A brief description of the problem is provided and the main and secondary factors of its occurrence are highlighted. The second step is collecting information. The employees conduct a comprehensive and in-depth information analysis of the problem, collect, and evaluate additional information. The third step is consideration of alternatives under the problem creative and comprehensive consideration from different point of views and mastering the techniques of constructive thinking. The fourth step is constructive decision-making, each alternative advantages, disadvantages and consequences analysis, and finding the most acceptable solution to the

problem. The fifth step is presenting creative and constructive solution of a professional problem. To organize teacher training, we combined these five steps into three stages. Because it is important for us to organize the new material learning. The training involves firstly the knowledge development, then their implementation in practice intentionally and then the implementation under new conditions, with expression of creativity. Therefore, we have implemented these five steps in three stages of organizing advanced teacher training. We will reveal them in more detail.

1. The information-theoretical stage is a preparatory phase for the development of creative and constructive teacher background. The purpose of this stage is teacher self-actualization, self-development of creative abilities and creative thinking. The tasks of the information-theoretical block are to provide knowledge about creative interaction and search for a constructive solution to professional issues. This stage involves the search for information and work with it on self-diagnosis and selection of methods of self-diagnosis, methods of teaching and education in accordance with creativity. The main methods of working with information are the information analysis, its filtering, cutoff, aggregation, and sampling. The methods of obtaining information are survey, pedagogical observation, and theoretical analysis of sources, analysis of products, method of analysis of weak points, professional discussions, pedagogical meetings, Balint groups, structural-morphological method, method of terminological and lexical analysis, method of indicators analysis and more.
2. Reconstructive-creative stage involves the accumulation of knowledge about creative activity. It forms a specialist with creative, constructive-mobile thinking who desires to improve himself in the professional field. The purpose of this stage is to use creative tasks, creative techniques and techniques of various nature in the teacher educational activities including training. Then one follows the reconstruction and analysis of various professional situations. The tasks of the reconstructive and creative stage are the teacher development as a creative intellectual, capable of creative and constructive interaction in all spheres of human life such as professional, public and personal. The core idea is to professionalize teacher training and learning from personal experience. The main methods of teacher training here are individual ones. They are following heuristic thinking; empathy; analogy; writing a solution to the problem, the method of structural matrices; inversion; the method of control questions, the method of coincidences and associations chains, the method "Why?"; Metchett's method; cards questionnaire; method of dividing the problem into components; presenting a nonspecialist's opinion; algorithm for solving inventive problems; method of eliminating hopeless situations; method of sevenfold search;



classification; induction; deduction; method of time relations; etc.). This stage at first involves identifying traditional, ineffective, ways to solve the problem so as not to follow to them. And the attention to the new or accidental ideas, to all aspects of problem solving, the conditions of its occurrence and solution.

3. Creative-representative stage is focused on the formation of skills and abilities of creative design and continuous improvement in processes (in their broad sense, not concentrated on the result) and within the team (approaches to work, thinking, relationships, work organization, professional activities, management). The idea of this stage is to consolidate the creative and constructive interaction skills in teachers and this allows to achieve advantages in competitive professional activities. The main tasks of this stage are the solution of creative tasks, which are the self-actualization of creative and constructive activities, and activation of internal potential, which affects the productivity of professional activity [12, 18, 33]. The main methods here are frontal and group. Among them there are such methods as brainstorming, synectics, professional discussions, the method of focal objects, circles, Balint group, round table, "speaker-opponent", discussion of weak points, laboratory of unresolved issues, conference of ideas, Philips-66, system of decision-making in a circlekingisio, method 635, business games, method of trigger technique, triads, wheels, TILMAG – method of transformation of ideal decision elements by means of matrices by association and community, method of morphological analysis, method of irritating word analysis, brainwashing pool, collective notebook method, Delphi method, engineer of ideas, etc.

All these steps (stages) must be implemented in a continuous process of training teachers. In the Japanese version, this process is called - "muda". Most work is a sequence of actions that will turn the source information into the final finished product. Some of these actions add value to the product, and some do not. The part that does not add value is a loss and must be eliminated, that is, all losses must be eliminated in the educational process. It should be mentioned that the level of scientific and pedagogical activities development in teachers "... is characterized primarily by values, coach interaction skills, reflection, the desire for continuous Kaizen-growth in the personal and professional sense" [16]. Thus, Kaizen technology is aimed at education in the result in the form of acquiring new competencies and new qualities. Given the effectiveness and possibility of using Kaizen technology in the children and teachers' education, the need to master it by teachers, as well as the fact that the Ministry of Education and Science of Ukraine Order No. 776 "On approval of the concept of pedagogical education" states, "successful professional activity pedagogical worker requires continuous training in conditions of dynamic change and the ability

to adapt to them. Professional development is aimed at the realization of the pedagogical worker himself as a person. The desire for self-improvement and self-education are important factors in the professional growth of the teacher, ensuring the expansion of his professional opportunities, cognitive interests and the formation of creative individuality" [1]. We have developed a regional educational program for teachers "Kaizen Technology", which acquires theoretical and practical knowledge about Kaizen technology and creative activity of teachers in particular; development of his creative and constructive interaction; training of a competitive specialist who will show creativity, professionalism and ability to make constructive decisions in his professional activity, generate and implement creative ideas in professional activities. We used the methods of synthesis, generalization, specification, modeling. The program is based on the qualifications of the teacher, on current legislation on education and secondary education in Ukraine. The purpose of studying the "Kaizen Technology" program is development in students following competencies: the ability to communicate in the state language both orally and in writing; ability to search, process and analyze information from various sources; ability to identify, pose and constructively solve problems; ability to generate new ideas, show creativity; ability to act socially responsibly; ability to adhere to the norms of professional ethics in the process of solving social, cultural, economic issues.

Objectives of the curriculum: acquisition of knowledge about Kaizen technology as a complex concept of providing conditions for self-actualization, self-realization of the individual, by modern-day forms and methods of teaching; realization of creative potential of personality; mastering the tools of Kaizen technology; mastering the techniques of constructive thinking; consolidation of skills of creative and constructive interaction; readiness for creative and constructive professional activity, development of professional, communicative, value-semantic competencies; development of the teacher's personality as a creative intellectual, capable of creative and constructive interaction in all spheres of human life such as professional, public and personal. The program consists of three modules. They are "The essence and origins of Kaizen technology", "Lean-education", "Kaizen-technology in educational management". The educational and thematic plan of the program is designed for in total 30 hours of full-time and part-time distance learning. So, 10 hours are given for classroom activities and 20 hours are reserved for independent study (correspondence form) [34]. The topics of the module "The essence and origins of Kaizen technology" are designed to master the philosophy of problem solving. The module covers topics related to the effectiveness and essence of Kaizen technology, Kaizen philosophy, the use of Kaizen in education. The topics of the module "Lean-education" include mastering the methods of diagnosing one's own interests and methods of self-development, improving education every day through collective and individual lean-thinking. Topics of the module "Management based on Kaizen technology in general secondary education" include mastering time management by teachers, the

theory of children's participation and educational dialogue on a subject-subject basis, facilitation, standardization in the selection of best teaching methods in the teaching staff of the secondary school. The educational and thematic plan includes online lectures. Correspondence-distance stage involves independent study of individual topics, professional literature and practical tasks. Evaluation of the effectiveness of training in refresher courses is carried out by writing a professional test and performing tasks in a microgroup.

#### **Content of the educational program by modules and topics:**

**Module 1.** "The essence and origins of Kaizen technology".

*Topic 1.1* The essence and origins of Kaizen technology. Kaizen concept in scientific theory and practice, in education. Philosophical and ideological foundations of Kaizen technology as an indicator of social progress. Retrospective analysis of the definition of Kaizen as the basis of creative and constructive pedagogical interaction. Principles of learning in Kaizen technology.

*Topic 1.2* The concept of Kaizen technology in education. Theory and experience of Kaizen technology implementation in education. Kaizen technology schools in the world and in Ukraine: advantages and difficulties. Kaizen concept: features of formation of innovative and creative educational environment.

*Topic 1.3* Kaizen technology as a comprehensive strategy of personal self-improvement. Self-diagnosis of the teachers and children interests and needs. Methods of interests and needs self-diagnosis. Methods of collecting and analyzing the received information. Basic methods of working with information: analysis of information, its filtering, cutoff, aggregation, sampling. Methods of obtaining information: survey, pedagogical observation, theoretical analysis of sources, analysis of products, method of analysis of weaknesses, professional discussions, pedagogical meetings, Balint groups, structural-morphological method, method of terminological and lexical analysis, method of analysis of indicators and more. Features of application of Kaizen technology in pedagogical employees training.

**Module 2.** "Lean-education".

*Topic 2.1* The concept of lean-education. Lean-education, its possibilities in the secondary education institution. The role of teachers and children in its implementation. Acmeology as a basis for daily improvement of one's activity and oneself. The role of self-actualization, self-realization and personal activity in improving the quality of education and self-education. Theory of children's participation (in the educational process). Kaizen technology tools and their application in the educational process.

*Topic 2.2* Individual methods of creative thinking that improve educational outcomes. Rules of creative problem solving in lean-education. Individual methods of creative solution of educational problems: heuristic reasoning, empathy, analogy, writing a solution to the problem, the method of structural matrices, inversion, the method of control questions, the method of coincidences and associations chain, the method of "Why?", the method of Metchett, card survey, method of dividing the problem into components, presentation of non-specialist opinion, algorithm for solving inventive problems, method of eliminating hopeless situations, method of seven-fold search, classification, induction, deduction, method of time relations, etc.). Quality of education in lean-education. Methods of choosing the best solution for lean-education.

*Topic 2.3* Collective methods of creative thinking that lead to improved educational outcomes. Rules of behavior in solving problems. The main methods of lean education (frontal and group): brainstorming, synectics, professional discussions, the method of focal objects, circles, Balint group, round table, "speaker-opponent", discussion of weak points, laboratory of unresolved issues, conference of ideas, Philips-66, system of decision-making in a circle – kingisio, method 635, business games, method of trigger technique, triads,

wheels, TILMAG – method of transformation of ideal decision elements by means of matrices by association and community, method of morphological analysis, method of irritating word analysis, brainwashing pool, collective notebook method, Delphi method, engineer of ideas, didactic games, brainstorming, written methods of collective problem solving. Methods of selecting the best solutions.

**Module 3.** “Management based on Kaizen technology in general secondary education”.

*Topic 3.1* Teacher time management. The concept of time management. Techniques of time management in preparation for the lesson, at the lesson, and after lessons. Organization of children’s time in class.

*Topic 3.2* 5S workplace organization. Maintaining an organized and efficient teacher workspace without clutter and wasting time for searching and preparing. Organization of convenience for the student at school. Multi-purpose design. Scientific organization of the teacher’s work.

*Topic 3.3* Organization of continuous improvement. Organization of morning five-minute teacher meetings. Mailboxes at school. Mapping programs. Effective communication and dialogue, facilitation. Class improvement meetings. Visual boards for improvement. Standardization of best practices and methods of organizing the educational process. The sequence of Kaizen technology implementation in the educational process.

Table 1 shows the structure of the program. It is important that teachers have the opportunity to creatively search, realization of personal creative potential. They should be able gradually master the techniques of constructive thinking and tools of Kaizen technology. Also, the teachers should have the opportunity to consolidate the skills of creative and constructive interaction and at the same time to conduct self-improvement and influence the future development of their pedagogical activities and their students. This program can be implemented in person, remotely, in the process of blended learning – it depends on the epidemiological situation and the desire of students. But for digital forms of education, they must have digital pedagogical competencies or at least digital literacy of the population. We discussed the possibilities of using Kaizen

technology in education at the round tables and methodological seminars of departments in such institutions of higher education as TNPU, I. Horbachevsky Ternopil National Medical University (TNMU), KhNPU and National Academy of the National Guard Of Ukraine (NANGU). It is recognized that this technology is interesting, but it is necessary to teach teachers and pedagogic employees to work on it. TNPU is preparing a program of elective discipline for the second level of higher education for future social educators “Kaizen-technology in socio-cultural activities”. At NANGU, this technology was the subject of methodical classes with scientific and pedagogical employees of the Department of Social and Humanities studies.

All this reflects the interest of teachers and educators, social educators to the problem and describes the possibility of its implementation in the training of specialists in various fields: military, pedagogical, socio-cultural and medical. At the same time, it is the pedagogical employees of general secondary education institutions of Ukraine who already have the opportunity to study under such a training program in Kharkiv and Ternopil [34, 35]. Training is based on philosophical, acmeological, complex, competence, creative and constructive, andragogic approaches. This involves the use of experiential learning, through training and exercises of a creative nature, gradually experiencing all stages of Kaizen technology. Comparing this program with the above training programs on lean-education, Kaizen technology in the workplace, we note that these programs are different in form and purpose and they have different participants in the educational process. Because workers are trained for themselves, and teachers still need to be trained to learn and educate by this technology children and themselves as an example of educational training for children. Although the philosophy and the principles of teaching are similar. The scientific foundations of the content are similar. The pedagogical program also adds the principles of teaching on Kaizen technology.

## 4 Conclusion

The analysis of the need to introduce innovative Kaizen technology in the training of teachers showed that this topic is very useful and interesting for teachers, as well as for research and teaching staff. The use of Kaizen technology is relevant in the training of teachers, as it will provide an opportunity to develop creative and constructive interaction, train a competitive specialist who will show creativity, professionalism and the ability to make constructive decisions in their professional activities. There are already schools that work on Kaizen technology, so teachers need to be trained. The purpose of the study is achieved – there is a developed program, its content is scientifically sound, the program includes 3 modules: “The essence and origins of Kaizen technology”, “Lean-education”, “Management in education based on Kaizen technology”.

Achieving the goal involved the implementation of research objectives, namely:



**Table 1.** The structure of “Kaizen Technology” regional educational program

Modules and topics	Instructor-led		Independent study
	Lecturers	Seminars	
Module 1. The essence and origins of Kaizen technology			
Topic 1.1. The essence and origins of Kaizen technology.	1		
Topic 1.2. The concept of Kaizen technology in education.	1		4
Topic 1.3. Kaizen technology as a comprehensive strategy of personal self improvement.	1	1	2
Module 2. Lean-education			
Topic 2.1. The concept of lean-education.	0,5		2
Topic 2.2. Individual methods of creative-thinking that improve educational outcomes	1		4
Topic 2.3. Collective methods of creative thinking that lead to improved educational outcomes.	0,5	1	
Module 3. Management based on Kaizen technology in general secondary education			
Topic 3.1. Teacher time management.	0,5		2
Topic 3.2. 5 S workplace organization.	1	1	4
Topic 3.3. Organization of continuous improvement.	0,5		4
Total	7	3	20

- 1) concretization and disclosure of the essence of the concept of “Kaizen technology” in the training of teachers, which is that: this technology is a long-term strategy for personal development, which has certain goals and uses in the process of achieving creative potential of the teacher; Kaizen technology consists of three interrelated stages, which gradually develops teachers’ independence, creative orientation, creative thinking, pedagogical skills: information-theoretical, reconstructive-creative, creative-representative; Kaizen technology involves mastering the essence and philosophy of Kaizen, lean-education and self-management of teachers.
- 2) scientific-theoretical substantiation and disclosure of the content of the regional educational program of advanced training of pedagogical workers “Kaizen technology”, recommendations for its teaching: according to this task it is substantiated that updating the content of professional training of teachers for mastering Kaizen technology is a complex of innovative scientific approaches: philosophical, andragogic, competence, constructive and creative, complex, acmeological approaches; the criterion for the effectiveness of mastering the Kaizen technology by teachers and its purpose is the professional readiness of teachers for creative and constructive professional activities. The developed regional educational program of advanced training of pedagogical workers “Kaizen technology” is based on these principles and stages, specification of its essence for teachers which are stated in point above. Recommendations for its implementation are experiential learning, through training and creative exercises in teacher training in blended learning, full-time or distance.

It should be noted that several schools in Kharkiv and Ternopil have already applied for this program, but now there are red quarantine zones in these cities, so their im-

plementation has been postponed until the danger of infection is eliminated. Prospects for further research are the approbation of the regional program for the implementation of Kaizen technology, its specification for research and teaching staff of higher education institutions, school social educators, psychologists, administration, etc., its experimental implementation in the educational process of general secondary education in various disciplines.

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# Psychological factors motivating the choice of university entrants

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**Abstract.** The article focuses on the study of factors influencing the choice of a university by entrants. First-year students' behaviour is mainly affected by external factors or factors not related to professional educational trajectory choice. An individual choice considers the limitations imposed by the size of family capital, abilities and other characteristics of the applicant, institutional factors (development of infrastructure, etc.). These restrictions affect the choice of future profession and a particular university, which largely determines the education quality. The most popular sources to receive information about universities are the official websites. The analysis of entrants' answers can become the basis for universities' PR and advertising programs. They will also be useful for optimising the content of the website. The university presentation's quality is one of the most critical factors in the independent search for a university without pre-established benefits. Advertising campaigns should be dominated by motives that promote a particular choice. They are the university's overall image, teachers' professionalism, and a clear definition of the actual possibilities for further work in the speciality.

## 1 Introduction

A common problem in many universities is the reduction in the number of applicants wishing to receive relevant education. As a result, the quantity of qualified personnel is declining. It is a problem not only for Ukraine. Many European countries are experiencing similar difficulties, where the number of students continues to decline [1–3]. Interest in technical and natural disciplines is especially noticeably falling [4–6]. Conversely, the population of the regions of Asia and North Africa is multiplying. The number of young people seeking to obtain higher education is growing [7].

The problem of declining student numbers in Ukraine has both objective and subjective reasons. Of the two reasons, the former is due to the demographic situation. The latter is more concerned with engineering or technological professions caused by the continuing decline in the Ukrainian industry. The problem is associated with a change in the number of manufacturing companies, low wages, and the lack of competitive Ukrainian products compared to cheap imports. All this affects future applicants' ideas about the prestige and prospects of engineering or technological professions [8–10].

Nevertheless, the popularity of specialities does not fully meet the requirements of the labour market. On the one hand, many engineering majors, as well as majors in natural sciences, are currently undervalued. However, their role will be vital for the development of industry and economy shortly. On the other hand, many social specialities or legal studies are overestimated. As a result,

graduates of such specialities cannot find their place in the labour market [11].

The Ministry of Education and Science of Ukraine is making efforts to eliminate this deformation. Nevertheless, we cannot say that the results are very impressive because this is a long process. It takes several years for the fruits of efforts to appear. It is also possible that the means used are not the most optimal. The problem at the level of the ministry smoothly flows into a problem at the university level. The question arises whether universities maximally use the right tools and opportunities or not.

Much attention is paid to individualisation issues in search of ways to interact with future students [12]. It takes a lot of effort and time. The following directions are important in the individualisation of higher education.

The first item concerns the identification of factors influencing the effectiveness of students' study of various disciplines. Scientists mainly study individual-typological characteristics of individuals (types of intelligence, psychological and physiological characteristics, etc.). The quantitative and qualitative composition of students' formed learning styles is most often mentioned as an integral and the most influential factor [13–15]. Teachers and students pay attention to expecting and preventing so-called "style conflicts" in modern publications.

Another area includes studying changes in students' cognitive load as a function of their characteristics, the type of material they master, the variety of resources used by teachers, etc. The specialists' efforts aim to identify the factors that cause a significant increase in cognitive load and the development of tools for managing it.

The formation of market relations creates novel approaches and additional problems in higher education. The

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rapid growth and development of the educational services' market initiate new educational institutions of different types. The increase in the number of educational institutions that train specialists in various fields and profiles makes the problem of choosing a university among many alternatives even more apparent.

The choice of university is a strategic point of further professional and personal development [16]. Responsible choice characterises a person as a subject of his/her own life, constructing his/her way of life. This problem becomes especially important in adolescence. A person makes a significant step towards adulthood, facing the need to make several vital choices, particularly university choice. The wrong choice of university and speciality becomes a crucial personal problem, which leads to dissatisfaction with professional activities, the comprehension that a large amount of time and money was wasted [17].

The problem of motivation in choosing a university is essentially a problem of efficiency and quality of education, which is obtained. It also acts as a problem of socio-psychological adaptation of students to the learning process conditions [18]. The motive of entrant choice is a question about the university's socio-economic success and the possibilities of implementing the experience gained by its graduates. Ultimately, the motivation for continuing professional self-education should result from higher education.

Today, higher education is becoming widespread, so most students are focused on obtaining it. However, the motives are formed in different degrees and by various factors [19–21]. University entrants rarely have a clear understanding or experience in the future profession, and this problem is unlikely to be solved. However, the university, which has traditions, history, and rich experience, can reveal professional activity specifics during the admission campaign. It requires constant monitoring of the values and targets of entrants.

In this regard, well-established communication with potential students is essential for university management [22, 23]. It is necessary to understand how entrants choose universities, what criteria are considered, which specialities are popular, and who decides on a university and speciality choice. In other words, each university, presenting a relatively extensive list of educational services, tries to attract the largest number of consumers. In turn, applicants and their parents, choosing a university, decide how well they provide these services.

The most critical element of competition between universities for the most talented and interested entrants is an adequate information and communication system. It should allow an entrant to quickly receive reliable, complete and useful information about the university from a perceived source [24, 25]. Deciding based on the received data, the entrant evaluates its usefulness and availability. An open, transparent communication channel is a good competitive advantage for the university in the education market. By the time of application, prospective students usually already know what speciality they plan to enter and what awaits them in the learning process and after graduation.

The article aims to study the psychological factors that shape applicants' demand and determine their behaviour during admission to the university. The work is focused on identifying possible ways to increase motivation and attract future students to obtain engineering and technological specialities.

## 2 Experimental

The experiment was based on a survey conducted among first-year students studying at six faculties of the Kyiv National University of Technologies and Design (KNUTD). The survey was conducted by questionnaire in early 2019. A total of 561 people were admitted to study in 2018. Two hundred ninety-five students (114 boys and 181 girls) took part in the survey *ex proprio motu*. Therefore, the survey covered almost 53% of the total number of first-year students. Table 1 illustrates the distributions of survey respondents and first-year students by faculties together with faculties' names, including abbreviations.

**Table 1.** Number of first-year students admitted by faculties and participated in the survey

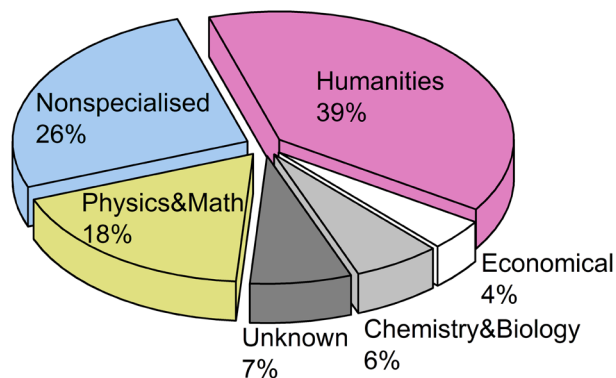
Faculties	surveyd		admitted	
	people	%	people	%
Design (D)	81	27	165	49
Economics & Business (EB)	71	24	120	59
Fashion Industry (FI)	17	6	26	65
Mechatronics & Computer Technologies (MCT)	49	17	55	89
Entrepreneurship & Law (EL)	39	13	129	30
Chemical & Biopharmaceutical Technologies (CBT)	38	13	66	58
<b>Total</b>	<b>295</b>		<b>561</b>	<b>53</b>

The questionnaire contained 11 questions and general information on age, sex, affiliation to the faculty and speciality. For each question, respondents were given several answers. All items can be grouped according to their focus. The problems of the first group (five questions) were aimed at describing the collective profile of the respondents:

1. Where did you finish secondary school?
2. Profile of the class in which you studied.
3. The average score of the certificate.
4. What subjects did you like at school?
5. What disciplines did you test in independent external testing (IET)?

The second group comprised four questions aimed at determining the key factors that served as the motive for the choice of KNUTD. The items in this group were as follows:

1. You chose KNUTD because...



**Figure 1.** Distribution of entrants by school specialisation

2. Indicate what attracted you to your chosen speciality.
3. Identify among the listed factors that influenced your choice of a higher education institution.
4. Have you registered applications for admission to a few various universities?

Two other issues concerned the information channels involved in the process of university selection. These questions are worded as follows:

1. Where did you get information about KNUTD and specialities that you liked?
2. Your choice of speciality was due to (specify).

The answers obtained during the survey were processed to understand entrants' motivation when choosing a university and specialities and identify the most effective channels for conveying the information to entrants.

The results obtained were presented in the form of ratings. This type of presentation usually does not require statistical processing of responses. Ratings are used to illustrate observed preferences qualitatively. They do not reveal the presence or absence of statistically significant differences between individual groups of responses.

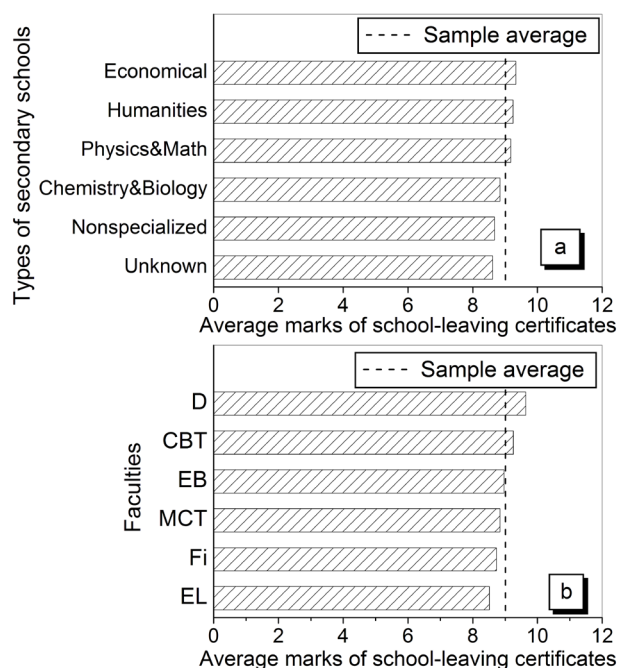
### 3 Results

#### 3.1 Profiles of respondents

Two hundred ninety-five first-year students took part in the survey. The largest number of entrants (53.7%) came from the cities of Ukraine (regional and district centres). Another 33.9% came from rural areas. The share of entrants from Kyiv was relatively small – 12.4%.

Entrants studied in secondary schools with different specialisations. The distribution of the number of entrants by school specialisations is shown in figure 1.

Graduates of humanities and non-specialised schools account for almost two-thirds of the total number of students. Together with graduates of physics and mathematics schools, these three school types' share reaches 83%.



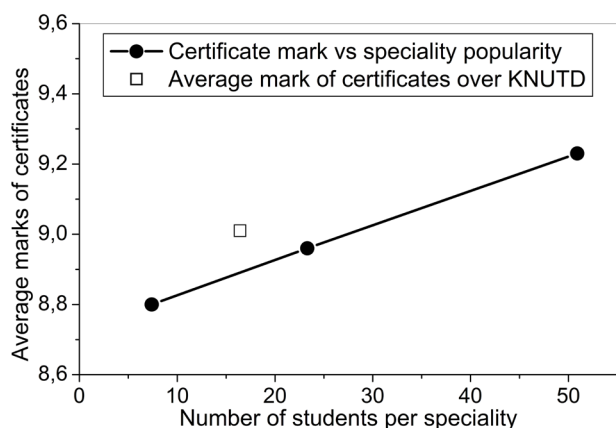
**Figure 2.** Average school certificate scores by school specialisation (a) and by faculties (b)

The average certificate scores are shown in figure 2a for entrants after schools of different specialisations. They are shown in figure 2b for first-year students at different faculties.

As seen from figure 2a, three types of schools (economic, humanitarian and physical-mathematical profiles) provide high (above average) scores in certificates. Conversely, graduates of the other three types of schools are characterised by relatively low scores of certificates.

Therefore, the structure of entrants by origin affects the average certificate scores at different faculties (figure 2b). For example, graduates of humanities and physics and mathematics schools make up over 71% of the total number of first-year students in the Faculty of Design. The share of graduates from non-specialised and non-established schools is only 21%. Therefore, the average score of certificates for newcomers at this faculty is the highest among other faculties. Conversely, among FEL entrants, the shares of the schools mentioned above with high and low average grades are 54% and 40%, respectively.

Specialities at the university differ in the level of popularity. More and less popular specialities can coexist at the same faculties. The number of students admitted to the speciality is an obvious measure of its popularity. It is conventionally accepted that prevalent specialities recruit over 30 students. Specialities with medium popularity have from 20 to 29 students, low – less than 20 students. Twenty-nine specialities at the university can be classified as unpopular, three exhibits an average level of popularity, and seven are very popular.



**Figure 3.** Correlation between the popularity of the speciality, expressed in the number of enrolled students, and the average score of their school certificates

Figure 3 illustrates the existing correlation between popularity and the average score of school certificates among students enrolled in these specialities.

There is a natural change in the average score from higher to lower with decreasing popularity of specialities. The obvious conclusion is that entrants with better certificates have a wider choice of specialities, including the opportunity to choose more popular ones.

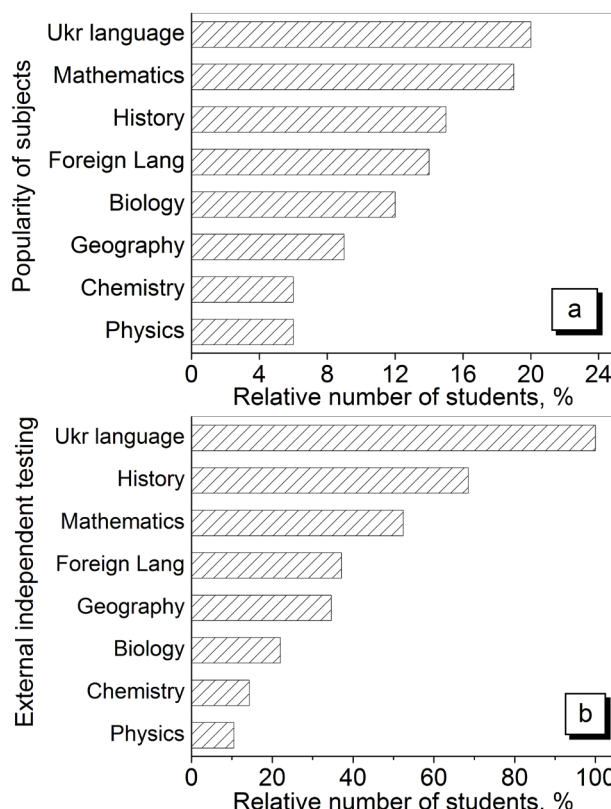
An essential characteristic of the entrants was the existing preferences over the subjects studied at school. These preferences characterised the propensity of students to learn in a particular field. They also served as one of the factors in choosing a speciality for admission.

Respondents expressed their preferences for specific disciplines twice, indicating preferences for school subjects (figure 4a) and listing the subjects tested by IET (figure 4b). In both cases, the number of items was not limited. The answers to figure 4 are given in relative units normalised to either the total number of mentioned subjects (figure 4a) or the total number of students (figure 4b).

The leaders among school preferences were the Ukrainian language, mathematics, history and foreign language. At least 15% of the total number of students expressed a favourable attitude to these subjects (figure 4a). A much smaller part preferred biology and geography, and chemistry and physics are among outsiders.

The picture looks similar among the external evaluation subjects: the three leaders of popularity and two outsiders have not changed. The result in Figure 4b indicates the existence of an objective factor that influences the choice of speciality. The lack of external evaluation makes it impossible for applicants to apply for budget proposals for specialities. For example, certificates in chemistry or physics are required.

Additional information on applicants' behaviour is provided by answering the simultaneous registration questions for admission to different universities. Only 14% of the total number of respondents limited their plans to join KNUTD only. The vast majority of entrants tried to enter various educational institutions at the same time.



**Figure 4.** Subjects that were named as popular at school (a) and were selected for the IET (b)

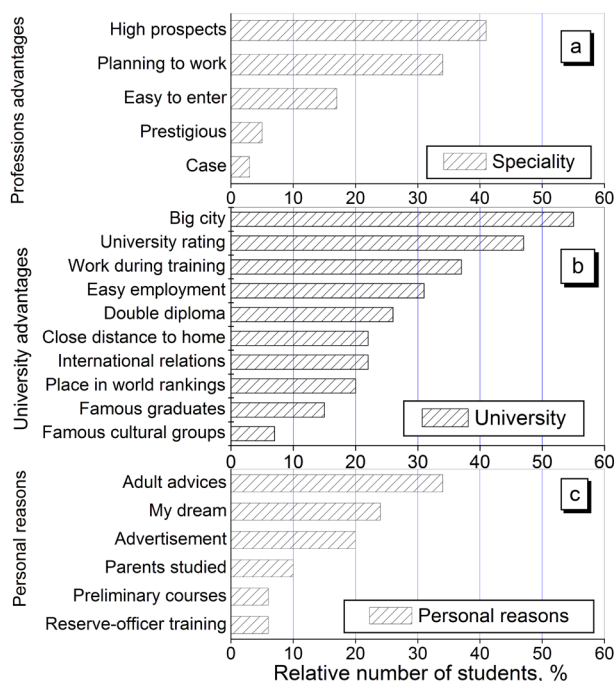
### 3.2 Motivation

The motivation of students in choosing a speciality has been studied in great detail. Relevant questions and possible answers to them are created for three levels of research of influencing factors. At the first level, the influencing factors concern the chosen university speciality or profession. At the second level, they cover the existing advantages of the selected university compared to other educational institutions. Variants of the influence of various personal factors are investigated at the third level. The results are shown in figure 5a-c.

Among the factors related to the chosen profession (figure 5a), the existing high prospects for professional growth and the possibility of further work in the speciality dominate among students' preferences. Together, these two factors are present in the answers of 75% of respondents. The influence of such factors is likely related to industrial development and the availability of jobs. The contribution of other factors in the choice of a profession does not exceed 17%.

Another type of factors, which is analysed in figure 5b, can be conditionally attributed to the reasons that forced students to enter KNUTD and not another university. These factors are closely related to the positions and advantages of KNUTD. They are a big city location that provides additional opportunities to work concurrently with studies and the university's position in various rankings. Such benefits are mentioned in at least 40% of





**Figure 5.** Main attractions in the speciality (a) and the reasons of different origin for admission to KNUTD (b, c)

the students' responses. About a third of the respondents consider the expected ease of employment and the opportunity to obtain a double degree as a significant advantage.

Another type of factors analysed in figure 5c can be conditionally attributed to the category of external and internal motivations of an individual. About 78% of respondents note that the decision to join was facilitated by adult advice, advertising materials or their dream of studying at KNUTD. Other factors, as motivations, were not very significant.

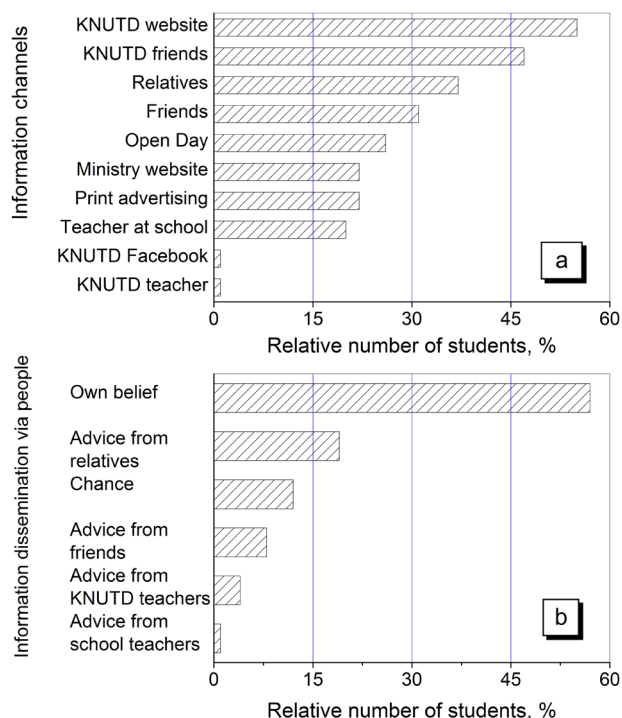
### 3.3 Information channels

The question of how to obtain information on KNUTD concerned either the popularity of different information channels (figure 6a) or the role of information dissemination through people (figure 6b).

The results show that most students receive information about KNUTD on the university website. Communication with relatives and friends (especially with those already studying at KNUTD) is also influential.

The low percentage of students who received information during the open days is noteworthy. There is almost no influence of print advertising and the university's Facebook page. The impact of interaction with school and KNUTD teachers is mentioned by only 1-2% of the surveyed freshmen (figure 6a).

Communicating with people is also an important way of obtaining information. As seen in figure 6b, entrants consider their own beliefs the primary reason for choosing (57% of all answers). This fact contradicts the results of the entrants' answers to another question. It is clear from figure 5c that they make decisions based on adults' and



**Figure 6.** Channels for the transmission of information about KNUTD (a) and ways for the dissemination of information through people (b)

parents' advice in 34% of cases. An explanation may be the peculiarity of the age of entrants' psychology (17–18 years). They attach great importance to their independence and do not reflect on how they decided. It is also clear that there is no influence through school and KNUTD teachers (about 5% of answers in sum).

## 4 Discussion

### 4.1 Psychology of motivation for university entrants

In analysing the motivational sphere, scientists distinguish between internal and external motivation types [26, 27]. The system of external motivation is associated with instrumental activities and an external control system. Increasing the complexity of the situation leads to an increase in tension, which the body seeks to relieve. When the goal of the instrumental activity is achieved, a state of pleasure and relaxation ensues. Internal motivation is a self-activity and internal control system, search for tension and difficulties, accompanied by interest and inspiration.

By the above approach, the motives for choosing a university are divided into external (advice from friends, for example) and internal (e.g., interest in a particular activity). The obtained results indicate a more significant influence of external factors.

Each entrant has goals and desires that shape his behaviour and ways to achieve professional plans. It is the reason for choosing a speciality for 29% of the respondents. However, the choice of the (49%) was influenced

by the advice of friends and reputable adults. It follows from the survey results and is entirely consistent with the literature data [28].

The position of senior family members deserves special attention [29, 30]. The behaviour of young people and their parents can be considered primarily adaptive from a psychological viewpoint [31, 32] Thus, the choice of the speciality of future students is dependent and indirect. Parents become the primary agents of choice in high uncertainty conditions, thus sharing the risk of possible unsuccessful choice. By adapting to the conditions of competition for places in universities, parents use social, informational, and economic resources and contribute to the rational use of children's intellectual resources.

Also, the relationship between parents and children in this situation is entirely consistent with the provisions of the theory of rational choice [33]. The transfer of control is most likely when the outcome of the action is uncertain rather than pre-determined. If a person believes that the transfer of control over his actions to another person, in this case, the parents, will lead to a better result, then such a transfer seems rational.

However, the survey showed that both personal interest and the opinion of parents are essential factors in choosing a speciality and university. Moreover, personal interest is more often shown when choosing a speciality (82%), and the view of parents contributes to choosing both a speciality (26%) and a university (12%).

However, personal desires and needs are not determinative factors of future students' choice, although they play a role. There is a contradiction between the indication of parents' significant role and the high percentage of respondents who consider their choice of a speciality an independent decision. We believe that the phenomenon of infantilism is the basis of the revealed contradiction [34, 35].

The psychology of the development of entrants' choice can explain such a contradiction. The sincerity of the respondents' answers about independent decision-making at this age raises reasonable doubts, even in an anonymous questionnaire. The reason is as follows. A competent and timely statement or opinion about professional activity in any field is often heard from an authoritative person. Such an idea can be easily, unconsciously and automatically transformed into a young person's own belief. As a result, respondents claim that their choices are based on their own beliefs.

Career prospects in terms of future upward mobility and the realisation of young people's ambitions and needs were essential in choosing a speciality. Opportunities to get a prestigious position with the prospect of career growth were noted by almost 61% of the respondents. 52% of the respondents chose their speciality, not by chance, but because they plan to work in this speciality.

These indicators are related to the prestige of the university. In recent years, rankings have become an essential attribute of the global market for educational services. Although none of them can offer an objective picture, this tool today forms a social reality. The survey results are evident; namely, 47% of entrants paid attention to the place

of KNUTD in the ranking of higher education institutions in Ukraine and 20% to the position in the world rankings.

One of the factors that influenced the choice of KNUTD was the position "Presence of well-known graduates, whose name became a product brand, etc." (15%). This factor is based on parents' and friends' stories about successful careers that may have taken place. Of course, it does not consider the real ratio of successful and unsuccessful careers after graduation. Nevertheless, it significantly affects the consciousness of students and entrants.

Factors such as "accidentally joined" (5%) and "not difficult to join" (6%) were not widespread among the respondents.

The study revealed the influence of institutional factors on the decision to choose a university. A reasonably necessary component of choice (28%) is the availability of a developed educational infrastructure (dormitories, libraries, classrooms, cafeterias, etc.). The presence of well-known dance, vocal and other groups as a factor of influence has a low rate (7%). It is explained by the fact that modern youth has a rather pragmatic mind-set. Mostly, students try to work in their spare time to provide decent living conditions. The university's location in the downtown area significantly influences entrants' choice (55%). Thus, this external factor must also be taken into account. Applicants want to live in a liveable city with a high standard of living, higher career prospects, etc.

Simultaneously, some students showed conformist sentiments, choosing "proximity to home" in the university's location (22%). Of course, this factor can be attributed to random. However, it would be unwise not to use it to attract students to the university. The criterion "parents or relatives studied here" is represented by insignificant values (12%). Such a result shows that family tradition currently does not significantly affect the choice of profession. Young people do not seek to follow the family dynasties.

The strategy of development of the educational field of KNUTD is aimed at creating new educational formats, namely: the possibility of obtaining a double diploma (26%), the opportunity to combine work and study (37%), international relations, working mobility programs (22%). All these are factors helped the students of KNUTD to decide on admission.

As a rule, the profession choice is determined by a combination of factors rather than a single factor [36]. Professional self-determination depends on abilities, family characteristics (status, education, material level), professions' social prestige, the media's role, and more. Some of these factors are the leading ones. The choice of educational institution was influenced by internal (interest in the profession, abilities, etc.) and external factors (location of the university, parents' opinion, etc.) As seen from the respondents' answers, external agents dominate.

## 4.2 Effective information channels

The essential tool to attract and influence competition between universities for the most talented and interested applicants is an adequate information and communication

system. Such a system quickly provides an applicant with reliable, complete and useful information about the university. An open, transparent communication channel is a significant competitive advantage of the university in the education market.

Analysis of the study results shows that the most popular information source was the official website of KNUTD. It was preferred by 65% of the respondents. Only 24% of the respondents made their choice thanks to the university's advertising campaign. A small group of respondents (8%) completed the final decision while studying at the university's preparatory courses.

As one can see, KNUTD entrants focus on prompt receipt of informative answers from the Internet, i.e. the maximum useful information on the website. It is also due to the group membership of entrants. A significant part of future students are residents of small towns and villages, most of which are far from Kyiv.

The all-university resource of KNUTD contains a separate section, "For entrants", which provides answers to admission's central questions. Information about the university's rating and its connections with employers is vital. Going to the pages of departments, users see information about the staff and history, which is useful, on the one hand. On the other hand, it does not form a good idea of the future speciality as follows from the survey results.

Therefore, it is desirable to change the design of the pages of departments. It seems logical to implement a well-known model of consumer behaviour AIDA (Attention, Interest, Desire, Action) [37]. The website needs to use tools that not only attract attention but also retain the visitor. The more time he spends on the website, the greater the likelihood of interest in specific proposals of a university. Various forms of interaction act as tools of interest creation. They are, for example, online quizzes and competitions, online testing of senior pupils, establishing the level of knowledge, etc.

Further, the website should help to transform the interest of the applicant into a desire. As a desire, in this case, we mean the desire to obtain more detailed information about the university and its structures. As an action, we understand the desired result, such as submitting applications and original documents and other applicant steps, leading to this result. They include registering for offline events, attending them, joining a university group on a social network, calling the admissions office, and more. In this regard, the main tools of the website, motivating to action, are all forms of feedback and contact with the applicant: buttons for interactive interaction "ask a question to the staff of the selection committee/order a call", online application services, social network buttons, etc.

One of the motives for youth professional formation is career guidance work, which is defined as a system of social and pedagogical influence on young people to prepare them for a conscious choice of profession. However, the results of the survey suggest that KNUTD (2%) and school teachers (3%), as well as the open days at the university (13%), do not practically influence the choice of future profession.

Career guidance is essential not only for the development of a young person's personality but also for society [28]. The result of professional self-determination is the performance by a young specialist of socially essential activities aimed at the production of a socially valuable product. However, today the career guidance work of the university is objectively selective. It can be defined as electoral career guidance to select the best entrants (high scores of IET, winners of school competitions, etc.). Universities are forced to build a system of career guidance that implements a selective approach at best. In the most extreme case, it is a recruiting strategy when all applicants are enrolled in the first year.

The analysis of channels and tools to influence entrants' motivation allows us to argue about the variety of existing tools for attracting applicants. The effectiveness of the information and communication system depends on the total number of tools used and their ability to influence entrants at all consumer behaviour stages.

## 5 Conclusions

1. Freshmen are mainly focused on external factors of university choice or factors not related to the will of professional educational trajectory. Of course, this trend leads to inevitable consequences at different levels. At the personal level, it leads to "professional frustration", depressed mood, intra-personal conflicts, lost time and money. It turns into the loss of "their" entrants and decreased prestige at the university level. At the level of society, it causes irrational use of money by the government, rising youth unemployment, lack of qualified personnel. All this suggests the need for better career guidance work that can provide a more informed profession choice.
2. A specific individual choice is made quite rationally. It considers the limitations imposed by the amount of family capital, abilities and other characteristics of the applicant, institutional factors (development of educational infrastructure in the region, etc.). These restrictions affect the choice of the future profession and a particular university, which largely determine the quality of education.
3. The official website is the most popular source of information for the entrant. It is necessary to pay attention to its content with important and interesting news to ensure entrants' maximum awareness. It is possible to increase the number of entrants by optimising career guidance information. One needs to consider the most influential factors, highlight important information for entrants, establish information communication channels, and attract optimal technologies for interaction with applicants.
4. Applied research to study the motives is useful only if they are information for reflection and simultaneously a university's PR and advertising program. Such a program should focus on the target groups of educational services consumers. The quality of



a university presentation is one of the most critical factors that act in the independent search for an educational institution without pre-established advantages. If the entrant's first impression has been generally positive, then he is more willing to cooperate.

5. The university's PR program is a necessary element, without which the implementation of educational policy is impossible today. Each university has a specific target audience for which it works: senior students and entrants, their parents. Therefore, to increase the popularity of the university, efforts are needed to promote its brand. Moreover, the advertising campaigns should be dominated by motives that motivate a particular choice: the overall image of the university, the professionalism of teachers, evident areas for further work in the speciality. One needs to intensify work with potential employers. The university's PR concerning future students promotes the educational institution, posting announcements about the university's life and employment of graduates after graduation.
6. A contradiction is observed between the positioning of students ("we make decisions independently") and the factors that influence their decisions (parents and adults) in reality. This contradiction is explained by theories of manifestations of infantilism, rational choice and adaptive human behaviour in conditions of high uncertainty. Information interaction with entrants and their parents must be built, taking into account these theories' provisions.

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# The prevalence of Cyberloafing among pupils belonging to the digital native's generation

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**Abstract.** The purpose of this research was to study the prevalence of cyberloafing among students in the classroom. 150 (66 are boys and 84 are girls) schoolchildren living in the Ural region of the Russian Federation between the ages of 13 and 15 took part in the study. The scale of cyberloafing by Y. Akbulut et al., translated into Russian used for the collection of empirical data. Student's T-criterion was used to analyze differences in cyberloafing levels in children of different sexes. The results of the research showed that during lessons they are most often interested in content and communicate with friends. The girls are more prone to cyberloafing than the boys. Girls are more likely to go to social media lessons and communicate online. Boys are more likely to play on the lessons in games on their mobile gadgets.

## 1 Introduction

The generation of modern schoolchildren is growing into the environment of information technologies. As a result, these children differ greatly from their parents and teachers in childhood in communicative skills, type of thinking, speed of information processing, etc. They are used by information technology everywhere, including in the classroom. A new term appears to refer to them, "digital natives". Differences in the social situation of development create conditions for intergenerational gaps and create new risks in the education system, which are insufficiently studied. Such risks include the use of information and communication technologies in classes for non-learning tasks – cyberloafing.

Researchers found that the use of digital technologies in the classroom leads to increased motivation of students [1, 2], learning reading and language skills [3]. However, there are also negative consequences of using digital devices (tablets, smartphones, laptops, etc.) in the classroom during the lesson. This activity poses a serious threat to the student's understanding of educational material [4], degrades the storage and reproduction of educational material [3], negatively related to academic performance [5]. Researchers point out that dominance in the entertainment content network distracts of schoolchildren from solving educational problems [6].

Thus, if students have access to digital technologies during the lesson, they can use Internet technologies to solve educational and personal problems. These tasks can compete among themselves. Researchers acknowledge that using the internet during a lesson to achieve personal (non-learning) goals – Cyberloafing is a problem that has

only been increasing recently [7]. A review of literature on this topic showed that: 1) much attention is paid to cyberloafing in the business sphere, but not in the education system; 2) foreign research on cyberloafing in the educational environment is mainly piloting. There is no such research in Russia. This can be explained by various reasons. First, there are no methods of measuring cyberloafing in Russian. Second, there is a low level of awareness of the scale of cyberloafing in modern schools. Therefore, the purpose of this research was to study the prevalence of cyberloafing behavior among school students.

## 2 Theoretical background

### 2.1 Cyberloafing

The concept of cyberloafing appeared in the scientific literature in the west in the early 2000s. V.K.G. Lim [7] proposed using it to designate the voluntary use by employees of Internet access in the workplace to solve non-work-related tasks during working hours. The meaning of the term has been refined and expanded over time.

The use of any digital technology and mobile devices for personal purposes in the workplace has been added to the content of cyberloafing [8, 9]. Besides cyberloafing there are many terms explaining the same or similar behavior like non-work related computing, cyberslacking, cyberbludging, on-line loafing, internet deviance, problematic internet use, personal web usage at work, internet dependency, internet abuse, internet addiction, and internet addiction disorder [10]. They all focus on employees using technology devices to pursue personal goals instead of working tasks.

Cyberloafing is seen as a special form of psychological protection (care) through the use of information technolo-

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gies [9]. It raises serious concerns among the heads of organizations, as it causes numerous problems [11]. This can be manifested in the tendency of employers to hire older people at equal levels of experience. Managers' tendency towards older people is mainly due to their higher level of reliability and professionalism compared to younger workers. Given that digital natives represent the workforce of the future, their perceived lack of diligence poses a growing challenge to organizations [12]. This problem becomes new in light of the study of the phenomenon of cyberloafing, which is also associated with the age of workers.

Researchers view cyberloafing as a type of counterproductive deviant behavior in the workplace [13–15]. But cyberloafing is different from classic versions of counterproductive behavior, such as theft at work, sexual harassment, deliberate delay, etc. It's linked to boredom in the workplace [16] and has positive effects such as minimizing stress, improving mood [17] and self-education [18].

Researchers are engaged in discussions about the structure of cyberloafing. V.K.G. Lim proposed a two-factor cyberloafing model. The author believed that cyberloafing consists of 2 types of activity: hanging on the Internet and using e-mail (a browsing or e-mailing activity) [15].

According to this concept, M. Anandarajan, P. Devine, and C. A. Simmers [19] cyberloafing include destructive behavior, the desire to entertain oneself, self-education, and ambiguous use of the Internet. The merit of this approach is to take into account the goals of cyberloafing. However, it is based on a person's subjective perception of the utility and appropriateness of a certain behavior, and not the behavior itself.

A. L. Blanchard and C. A. Henle suggested that cyberloafing can take two forms: minor cyberloafing (for example, sending and receiving personal email at work) and serious cyberloafing (for example, online gambling, viewing pornography, participating in chats, and viewing blogs). This model is useful in studying the consequences of cyberloafing [20].

S. Yasar distinguished four forms of cyberloafing: individual (shopping, travel, job search, carrier, and online banking), social (personal or group chat, social networking sites, discussion boards, instant messaging, and e-mail), search (searching, pictures, video on search engines, etc.), and news (news, sport, weather sites, and bulletin boards etc.) [21].

Thus, it can be concluded that there are different forms of cyberloafing behavior that can be isolated from different bases. In addition, the emergence of new technologies leads to the emergence of new forms of cyberloafing.

## 2.2 Cyberloafing in the academic sphere

A review of research on cyberloafing shows that this phenomenon is actively studied in the business environment [7, 11, 17]. But, this phenomenon is present in other spheres, for example in the academic environment [3, 5, 17, 22]. Researchers note that the sphere of education belongs to one of those areas where the Internet

is used most intensively [23]. The proliferation of mobile technologies and wireless networks brought not only new opportunities but risks to education too. Use of information and communication technologies in non-learning classes – cyberloafing can be attributed to risks [24].

Cyberloafing is seen as a barrier to the successful integration of information and communication technologies into the educational environment [25]. In the field of education, the subjects of cyberloafing can be 2 parties: teachers and students. At the same time, empirical evidence suggests that students are more susceptible to cyberloafing than teachers [26].

Researchers view cyberloafing behavior among teachers as an obstacle to professional duties that refers to the side effects of using devices with internet access. They suggest that cyberloafing may be one of the symptoms of professional burnout of an Internet teacher [17]. In general, this phenomenon has not been sufficiently studied to date.

The attention of researchers is drawn by studying the level of cyberloafing among studying (school and university students). First of all, the reasons for using Internet technologies in the lesson to solve non-educational problems are analyzed. E. Ergun and A. Altun highlight the following causes of cyberloafing: motivation, goals, teacher, environment and time [27]. Other authors add the following items to this list: course content, student identity and level of information technology ownership [17, 22]. The results of studies of personal predictors of cyberloafing of students revealed that this type of behavior in the lesson is influenced by psychosocial perceptions, attitudes, and strategies of training, but not educational motivation [5]. Researchers refer to environmental factors associated with students cyberloafing behavior. They are class level, family income, and place of residence [28].

Research has shown that cyberloafing behavior exists in a modern school. However, its distribution depends on the quality of Internet technologies in the country and on their use in school [13, 23, 29]. Researchers point out that in schools, different types of cyberloafing behavior can be observed in school students sometimes or rarely.

Thus, researchers view cyberloafing as a harmful distraction in the classroom that can have a positive effect under certain conditions. In particular, researchers recognize the potential of cyberloafing as a means of recovery [5].

## 3 Method

150 schoolchildren living in the Ural region of the Russian Federation between the ages of 13 and 15 took part in the study. Of these, 66 are boys and 84 are girls. The study was conducted during the summer holidays to reduce the impact of fear of punishment.

The scale of cyberloafing Y. Akbulut et al., translated into Russian it was applied for the collection of empirical data. A personal information form to address the background variables of the study was followed by the scale.

The cyberloafing scale addressed the frequency of 27 cyberloafing behaviors which ranged from 1 (never) to 5 (a great extent).

Factors of the scale were sharing information (3 items such as posting content, chatting, leaving comments), shopping (6 items such as online shopping, auctioning, banking), activity on social networks (9 items such as publish posts on social networks, read posts on social networks, likes posts on social networks), accessing online content (6 items such as downloading music, videos and applications) and socialization (3 items such as updating status on social networks, mark friends in photos).

Table 1 shows the results of the reliability analysis of the measuring device used by Cronbach's alpha. Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It can be written as a function of the number of test items and the average inter-correlation among the items.

The original scale was developed with 150 schoolchildren [29].

The explained variance was 63.7% for the sample. Cronbach's alpha coefficients were high for the total scale (0.932) and individual factors as follows: sharing information (0.813), shopping (0.881), activity on social networks (0.839), accessing online content (0.867) and socialization (0.775).

Student's T-test for independent samples was used to analyze differences in cyberloafing levels in children of different genders. All analyses performed in this study were conducted using the Statistical Package for the Social Sciences (SPSS) version 23.0.

Skewness and kurtosis values were between -2 and +2, so the normal distribution assumption was met (see table 2).

#### 4 Findings

Data indicate that schoolchildren use the Internet to search for information and communicate online during lessons more often than other types of cyberloafing behavior. Schoolchildren shop and share information during lessons rarely. These characteristics are observed among both boys and girls.

Descriptive statistics along with parametric test results are summarized in table 3.

Analysis of differences between respondents of different sexes showed that girls are more prone to cyberloafing than boys. Similar data were obtained when studying the use of smartphones by students from China [30].

Girls are more likely to go to social media lessons and communicate online (figure 1, figure 2).

#### 5 Discussion

In the study presented, the level of cyberloafing in schoolchildren indicates that they use Internet access during lessons to solve non-learning problems rarely or sometimes. Similar data on the prevalence of cyberloafing were found on samples of students from Turkey [3, 31] and Turkish students of 6th-8th grade [32].

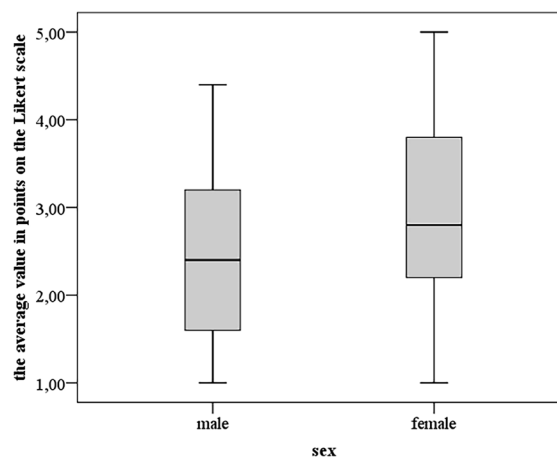


Figure 1. Social media activity during the lesson

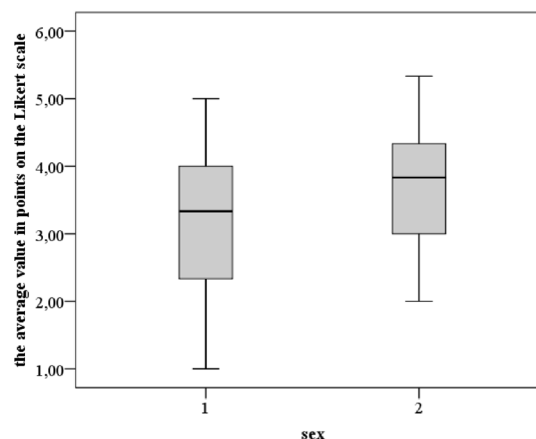


Figure 2. Communicate with friends (socialization) online during lessons

The differences concern the types of cyberloafing behavior typical of participants in this study and schoolchildren from other countries. In this research schoolchildren more often use access to online content and solve problems of socialization (self-expression and maintenance of significant relations). According to other researchers, students communicate more often during classes via the Internet [26]. Such differences may be related to the age difference of the study participants.

Conflicting data on gender-related differences are found in cyberloafing studies. One study found no differences in cyberloafing levels in people of different sexes [33, 34]. Other studies report that there may be differences due to differences between men and women in approaches to the use of technology, interests, motivating elements and goals of misuse of the Internet [17, 33]. It is believed that the reason for the inability to detect differences is related to the features of the research group. For example, in our case, it may be the age of respondents. On the other hand, gender differences were found to influence the purpose of media use, including social networking sites [31],

**Table 1.** Scale resistance to measurement errors

factors	number of items	Cronbach's alpha
cyberloafing	27	0.936
shopping	6	0.881
accessing online content	6	0.867
activity on social networks	9	0.839
sharing information	3	0.813
socialization	3	0.775

**Table 2.** Assessing of use of the Internet for personal reasons at lessons at school

factors	min	max	M	Skewness	Kurtosis
cyberloafing	1	4.27	2.5	0.04	0.66
shopping	1	4.83	2.0	0.998	0.394
accessing online content	1	5	3.1	-0.29	-0.93
activity on social networks	1	5	2.7	0.05	-0.89
sharing information	1	4.83	2.0	1.31	1.13
socialization	1	5	3.4	-0.68	-0.32

**Table 3.** Summary of independent samples t-test with regard to gender

factors	Groups	N	M	SD	T	p
cyberloafing	male	64	2.4	0.82	-0.96	0.34
cyberloafing	female	86	2.5	0.74	-0.96	0.34
shopping	male	64	2	1.1	-0.04	0.97
shopping	female	86	2	0.98	-0.04	0.97
accessing online content	male	64	3.1	1.2	0.56	0.58
accessing online content	female	86	3.02	1.04	0.56	0.58
activity on social networks	male	64	2.5	1.04	-2.54	0.01
activity on social networks	female	86	2.9	1.08	-2.54	0.01
sharing information	male	64	1.93	0.86	-1.01	0.314
sharing information	female	86	2.07	0.75	-1.01	0.314
socialization	male	64	3.04	1.12	-3.53	0.001
socialization	female	86	3.65	0.99	-3.53	0.001

features of self-presentation in networks [35], choice of content [36].

Many studies suggest that men exhibit cyberloafing-related behaviors more often than women, both in workplaces and in educational institutions [35]. Turkish researchers explain these gender differences in Internet use. They note that according to a recent national report in Turkey, the number of male Internet users exceeds the number of female users [26]. Researchers suggest that the habit of using the Internet men will carry and at the place of work or study. However, gender differences in Internet use and cyberspace can also be controversial. For example, gender differences may vary depending on the type of cyberloafing [26]. This has also been confirmed in our study. Gender differences in cyberloafing behavior can also be influenced by the nature of the target audience [33] and the inclusion of control variables such as social desirability [26].

Analysis of gender differences on individual cyberloafing factors showed that men have higher scores on scales: shopping, access to online content and games [26]. Another study found that women are more likely than men to use smartphones to both distract and achieve educational goals [27]. Our study found that girls are more likely

than boys to attend social media during lessons and use the Internet to solve socialization problems. These differences can be explained by the fact that psychological characteristics related to sex determine the general activity of the person, including information [37].

## 6 Conclusion

The results of the study conclude that study participants rarely use Internet technologies for personal purposes during classes. They are distracted to communicate with friends or find interesting information. It was found that cyberloafing behavior differs among school students of different sexes.

The study presented has a number of limitations. The study used self-accounts as a data collection tool. They have the following limitations: inconsistent or socially desirable responding [38]. Another limitation is that the scale used does not take into account a kind of cyberloafing behavior like gaming.

Despite the limitations described above, the study presented is the first conducted in Russia. Its results are of interest to the organization and further study of cyberloafing in our country.



Conducting a survey during the summer holidays could affect the results of the study too. Therefore, more research is required on cyberloafing in conditions closer to natural ones. It is promising to study cyberloafing during distance learning, as measures to prevent the spread of COVID-19.

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# Psychological factors of ICT competence formation in part-time students of the specialty “Preschool education”

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**Abstract.** The transience of time and the use of information and communication technology (ICT) have led to the urgent necessity – the formation of the educational process subjects’ ICT competence. In today’s educational sector in Ukraine and foreign countries, the studied phenomenon has acquired special significance. The goal: a) theoretical analysis of various aspects of the individual’s ICT competence formation, clarification of the essential content of the concept and offer its working definition; b) figuring out psychological factors of influence and their constructs on the ICT competence formation; determination of criteria, indexes and levels of the studied phenomenon formation; c) empirical study of the influence of psychological factors on the ICT competence formation in applicants for educational services of higher education institutions (part-time students of 2 Ukrainian universities). Conceptually psychological factors which have an influence on the ICT competence formation were characterized. The main criteria of ICT competence were offered, their indexes were defined and the description of levels of formation was given. According to the results of the empirical study the dependence of the influence of various psychological factors on the ICT competence formation in accordance with the pedagogical experience of 187 respondents was found out.

## 1 Introduction

Modern changes in the world, due to various transformational processes, both positive and negative, are characterized by challenges, the response to which requires mastering new competencies. The formation of a number of competencies has become one of the main tasks specified in the Law of Ukraine “On Education” [1]. Among the list of such is the competence in the field of information and communication technology (ICT competence), which should be formed in all subjects of the educational process [2]. (Hereinafter referred to as the term ICT competence). Thus, the reform of the educational system, including its first component – preschool education, has raised the issue of future preschool education teachers’ ICT competence formation.

The raised problem caused the purpose of carrying out research:

- realization of the theoretical analysis of a problem of ICT competence formation, specification of the essential maintenance of concept and specification of its working definition (in the general aspects and in a context of the individual’s of professional pedagogical activity implementation);
- clarification of the factors influencing, in particular psychological and their constructs, on the ICT

competence formation, substantiation of the definition criteria, indexes and levels of the studied phenomenon formation;

- empirical study of the influence of psychological factors on the ICT competence formation of teachers of the first (preschool) component of the Ukrainian education system, in particular part-time students, as specialists who lay the foundation of a child’s growing personality.

Modern scholars have studied various aspects of the individual’s ICT competence formation:

- the use of ICT to improve the quality of the educational process, in particular, the introduction of digital literacy and the study of effectiveness [3–8];
- creation of information and educational environment for the formation of ICT competence in the subjects of the educational process [9–19];
- clarification of methodological approaches in the formation of this phenomenon in the training of preschool education specialists [20–25].

First and foremost, the essence of the concept of “ICT competence” requires clarification. We state that today there is still no unanimous vision on the use of its definition and variations among scientists (most frequent is the definition of information and communication competence – IC competence as identical in meaning). The studied

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concept is presented in many ways, but based on the synthesis of different scientific positions, in our understanding, the following definitions of “ICT competence” are the most accurate, namely:

- integral quality of an individual, which indicates his/her ability to solve problems and typical problems that arise in real life situations, with the help of ICT, which contributes to the achievement of professionally significant goals [26];
- integral quality of personality, which includes motivation to master the relevant knowledge, the ability to solve problems in educational and professional activities with the help of computer technology and mastering the techniques of computer thinking [27];
- cognitive quality of an individual, which includes a set of knowledge, skills and abilities to perform various types of information and communication activities; the ability to use them in solving problems using the latest information technology [5, 28];
- structural component in the general system of the specialist’s professional competence, a kind of stage in the formation of his/her information and communicative self-consciousness, which is manifested in information and communication culture, information and communication literacy, information and communication activities [12, 29];
- the ability of an individual to perform professional functions by searching through various means (through various media resources) for information to communicate, solve problems, gain new knowledge and generate solutions, which ultimately ensure his/her self-actualization [30, 31];
- a system of knowledge, skills, abilities, personal experience and personal qualities, which are aimed at effective and rational use of modern ICT, search, analysis and critical understanding of information, mastering rational methods of working with different types and sources of information to perform tasks in various spheres of life and confident orientation in the information space [32].

According to the given above, we emphasize that the ICT competence formation in the participants of the educational process is not only the accumulation of special knowledge, skills and abilities, but, above all, the development of information and communication self-consciousness, ability to carry out relevant thinking (criticality, logic, argumentation, verification of information, etc.), which affects the formation of a holistic picture of the information world, in which the subject should be able to navigate. Based on the research results of the Ukrainian scientific school on the ICT competence formation, we note that in its structure one of the components is identified. It’s the personal necessity to use ICT for the successful performance of professional duties [33, 34]. The personal component strengthens the cognitive-active field of participants in the educational process, reveals their attitude to ICT, the desire to satisfy their own and professional interests, etc. Thus, despite the existing versatility

of interpretation of the studied phenomenon, based on the generalization of different scientific positions, we offer the following *working definition*: integrated quality of an individual, which is the ability to navigate in the information space, receives information and operates it, performing professional tasks and meeting their own needs to the requirements of the modern high-tech information society.

A number of studies are devoted to the study of the peculiarities of the ICT competence formation of participants of the educational process. Scientists have proved that the use of ICT for the ICT competence formation of future professionals ensures the introduction of innovative educational technologies, promotes individualization of the subjects of the educational process of study, stimulates the intensity of independent search for information sources, increasing personal motivation [3–5, 32, 33, 35–44]. This clearly distinguishes the problem of figuring out various factors of influence, including psychological, on the ICT competence formation, because it is impossible to achieve high results without conscious understanding of the individual’s role and importance in their own and professional activities.

## 2 Psychological factors influencing the individual’s ICT competence formation

### 2.1 Conceptual positions of determination of psychological factors influencing the individual’s ICT competence formation

Without diminishing the social, pedagogical and other factors influencing the ICT competence formation, we conceptually characterize only psychological. They determine individual achievements in mastering the relevant competence, promote personal growth, which is manifested in activities, communication skills, forms of behaviour and so on. Based on the study of different methodological approaches (system-activity, personality-oriented, integrative, environmental, competence, structural, etc.) to the formation of future specialists of the studied phenomenon and the analysis of scientific research, the following *psychological factors* of ICT competence were outlined: reflexivity, motivation, sociability [2, 20, 28, 45, 46]. (We present their essence in relation to the focus of scientific research – is an individual with pedagogical professional field of activity).

On the basis of *reflexivity* an analysis of a specific situation related to the use of ICT is taken place, the dynamics of its deployment and its own participation in it is occurred, achievements and shortcomings are evaluated, personal manifestations and professional qualities in this area are recognized. The reflective factor in the ICT competence formation is determined by the attitude of the individual to himself, to his achievements and miscalculations, to the results of their own practical activities and the development of plans for improvement or improvement in case of low self-esteem. Reflexivity as a psychological process of self-knowledge promotes the development of the ability to realize their own mistakes on the basis of awareness of ICT and scientific and methodological bases

of their use, to follow the causes and results of their occurrence. This allows the individual to correlate the results of activities with certain reasons, to monitor them and draw appropriate conclusions, which require significant internal efforts. Reflexivity contributes to the expansion of personal experience, when the acquired knowledge about new ICT is transformed into skills and become automatic.

The motivational factor includes motives, purpose, the necessity of ICT application, aspiration to automation of the formed skills. Its development is based on the emergence of emotional adjustment to meet the need, which is to improve their personal position, aimed at carrying out both professional pedagogical activities and to obtain new knowledge to improve personal development. Motivation along its trajectory has a difficult way to implement the idea, which, above all, stimulates the emergence of an appropriate attitude to the situation: “goal – I want to master the usage of new ICT; motive – I want to find it, to study and assimilate; need – to implement in real practice; the result – is emotional satisfaction, personal self-realization and self-improvement”. The motivational factor is fundamental to the system of values which an individual follows in mastering the knowledge, skills and abilities to use ICT. Motivation is a stimulus to activity, which always involves the use of volitional efforts, which are reflected in the regulation of behaviour, in the direction of activity and resilience of the individual to meet the need, such as looking for new information resources, etc.

*Sociability* as a psychological factor ensures the implementation of the transformation of the social requirement for contact in the created information and communication environment. It is manifested in the ability to establish interpersonal relationships using ICT, to choose the optimal style of information technology communication in different situations, to master the means of verbal and nonverbal communication. Sociability is manifested in the ability to communicate effectively with various participants in the educational process, if it is a professional activity or interest, in the case of personal needs, which contributes to establishing relationships with partners, the development of skills for constructive interaction. Communicative traits of an individual include the ability to listen, understand others, be tactful, be polite, and so on. The sociability of the subject ensures the success of his/her social interactions and promotes impartiality towards the views of others. Sociability testifies to the openness of the individual, the desire to continue cooperation. In polylogical communication, the individual activates all his/her communicative skills of conducting a substantive conversation/discussion concerning agreement with the participants of the interaction of their values and ideas, joint formulation of generalizations about the course and results of such activities.

## **2.2 Basic psychological constructs of individual's ICT competence formation**

From the above it is clearly outlined that all the identified factors are closely intertwined and contain certain constructs of ICT competence. Regarding the factor of reflection, a cognitive and operative construct can be seen.

The cognitive construct should provide free mastery of personal skills of information processing and work with information and technical objects, which accordingly affect the skills of improving professional knowledge and skills, knowledge of interdisciplinary links, etc. The level of cognitive construction is determined by completeness, depth, systematic knowledge of the individual regarding the use of ICT. The operational construct characterizes the ability of a person to navigate in the information space, “get information and operate it in accordance with their own needs and requirements of modern high-tech society” [46]. The development of the operational construct testifies to the ability to regulate one's own cognitive activity freely and to select information from the whole set of information resources.

Revealing motivation as a factor in the formation of ICT competence the place of values and motivations in it are emphasized, which gives grounds to characterize their constructs that are part of it. The *value* construct in the ICT competence formation actualizes the stimulation of individual's creative manifestations in professional activity. It presupposes the presence of interest in professional activity, which characterizes an individual's need for knowledge, in mastering effective ways of organizing professional activity. Only perceived need as a value motivates us to perceive the results of our activities or behaviour rationally and objectively. As a result, there is an acceptance of the others position, the respect for their values and meanings formation, as well as awareness and acceptance of their own inner world – in the context of a critical dialogue with others and with themselves. The formation of a value construct is impossible without activating the *volitional* construct of the individual, when he/she is faced with the task of making an effort to master a new technology, to motivate him/herself to exercise self-control of newly obtained information and communication technical skills. Due to the development of the will, the individual is able to regulate their behaviour with others, can conquer their own spontaneity, taking into account their positions, ideas and so on. This ensures the development of common values for the application and extension of advanced ICT.

Sociability develops in the joint activities of an individual with other participants in the educational process during the ICT competence formation, which is necessarily reflected in the actions (behavioural reactions), discussion of new ideas and ways to implement them (creativity). *Conative (behavioral)* construct – is the active use of ICT and various gadgets in professional activities as a means of cognition and development of ICT competence, self-improvement and creativity, as well as the education of similar qualities in other participants of the educational process. And the *creative* construct creates favourable conditions for further modelling by the person of the innovative, non-standard program of the professional actions connected with application of ICT. The conative construct helps to determine the vector of one's own actions, the development of responsibility in making and implementing decisions on the implementation of ICT.

The presented constructs within the revealed psychological factors of ICT competence formation are consid-



ered in definition of criteria and indexes in research of the specified phenomenon.

### 2.3 Presentation of criteria, indexes and levels of individual's ICT competence formation

We consider it worthwhile to analyze the existing developments of scientists regarding the explication of the criteria for the ICT competence formation. The issue raised has diversity of scientific views. The most relevant to the stated topic in the study of various areas of ICT competence (including IC competence), in our opinion, are the following criteria:

- Definition (Df), Access (Ac), Evaluation (E), Administration (Ad), Integration (I), Creation (C), Delivery (DI) [45];
- motivational-value, cognitive-contentive, operational-technological, reflexive-evaluation [47];
- informational, motivational, activity [48];
- axiological, epistemological, praxeological [49];
- cognitive, social-communicative, gnostic-developmental, activity-technological [50].

Thus, based on the generalization of the analyzed scientific views on the author's conceptual provisions, the following criteria and indexes of ICT competence formation are determined.

- *Cognitive-operational*: the available knowledge and operational skills that reflect the degree of ICT awareness and their conscious use in professional activities; ability to reflect, analyze and evaluate their own both cognitive and practical activities; awareness of the selection and processing of information from the whole set of information resources; ability to determine the expediency of using certain ICT in professional activities; development of the ability to develop and apply ICT in professional activities.
- *Value-volitional*: the presence of interest in mastering ICT and their persistent development; satisfaction of one's own ambitions regarding the need to form ICT competence; formation of a value attitude to professional and pedagogical activity with the use of ICT; awareness of personal meaning and significance of ICT competence; strong-willed persistence in striving for professional self-improvement in relation to mastering ICT; development of ability to carry out purposeful search of information and technological resources; formation of the ability to act balanced, guided by rational motives, and to objectively perceive the value positions of others; regulation of the balance between their own desires, needs, opportunities and motivation to achieve high performance in professional activities for the use of ICT.
- *Conative-creative*: the use of ICT in various forms using the latest methods of working with them, the development of the ability to overcome difficulties in mastering ICT, using creative approach; the ability to establish emotionally positive relationships between all participants in the educational process in an information

and communication environment (places of professional teaching); ability to professionally use the means of ICT to establish communication, exchange and spreading advanced ideas in the application of ICT; ability to create an atmosphere of creativity and positive attitude between the subjects of joint activities; the desire to implement innovations that stimulate the ICT competence development.

The outlined criteria and indicators made it possible to characterize the following levels of ICT competence formation: high, medium and low.

- The *high* level is defined as the possession of profound knowledge in the field of ICT and the ability to use them with the use of modern scientific and methodological tools; developed ability to freely regulate their own cognitive and exploratory activities in mastering the latest forms and methods of professional activity with the use of ICT; striving for self-improvement in the use of information tools in the work of the participants of educational process. Respondents with a high level of mobility in the establishment of friendly relations are able to regulate their own ambitions, consider the values of others; are able to create an atmosphere of creativity and positive attitude in their own behaviour. They tend to thoroughly analyze the possibilities of ICT, are able to technologically represent their own professional activities in relation to the use of ICT, giving it adequate self-assessment and quickly identify problems in overcoming difficulties in mastering skills that stimulate ICT competence formation.
- The *medium* level is characterized mainly by mastered knowledge in the field of ICT and the average desire to use them in professional activities with the introduction of modern guidelines; sufficient possession of the ability to regulate their own behaviour, establish contacts and communication with participants of the educational process. Representatives belonging to the medium level group have the ability to establish trusting professional relationships, although significant errors in the use of ICT tools may be assumed. Usually it is not difficult for them to create an atmosphere of creativity and organize activities with the use of ICT, but they do not initiate it on their own. Self-assessment takes place in urgent situations, but they seek to overcome difficulties with group support in the process of mastering ICT. Medium-level respondents have the ability to analyze the possibilities of ICT, although they do not demonstrate a desire to present their own experience of ICT competence technologically.
- The *low* level is manifested in the lack of knowledge in the field of ICT implementation, their selectivity, lack of desire to find innovative approaches and tools to be used in their own professional activities; difficulties of free behavioural regulation aimed at the creative selection process and use of information and software tools in working with participants in the educational process. Respondents belonging to this group find it difficult to establish contact, they defend their own ambitions, they

are reluctant to show willpower. They do not demonstrate an independent desire to use ICT tools professionally, work in a reproductive atmosphere. The implementation of adequate self-esteem is characterized by various obstacles from others, make mistakes in identifying problems and lack initiative in overcoming difficulties in mastering ICT. They have a poorly developed ability to analyze the possibilities of ICT and their use, usually avoid the technological presentation of their experience in the ICT competence formation.

### **3 Methodology of research of the influence of psychological factors on the individual's ICT competence formation**

*Research tools.* The main tool of the empirical research was the use of a written questionnaire – filling out a questionnaire “Personal need for ICT competence in professional activity” in the author’s modification [49]. The purpose of its use is to diagnose the influence of psychological factors on the ICT competence formation of teachers of the first (preschool) component of the Ukrainian educational system – teachers of preschool education, who are also applicants for educational services, and, in particular, study in specialty 012 “Preschool education” and, respectively, work in the specialty. The choice of such a research group is due to the fact that it is from the moment of individual’s formation (and this basis is formed in preschool childhood), they must obtain all the necessary competencies for life, among which the main one today is ICT competence. The level of this competence of preschool teachers’ formation will directly influence its development in children.

The content of the questions was grouped into three semantic blocks that correspond to the essential substantiation of the presented psychological factors: reflexivity, motivation, sociability. The analysis was also based on methodological approaches suggested by modern scientists [26, 28, 29, 47]. The main thesis of the empirical study of determining the influence of psychological factors on the level of ICT competence was that the latter “is based on sets of relevant understandings, knowledge, attitudes and skills”, the assimilation of which occurs during university studies and immediately transferred to real practice, because part-time students are working in the field of teaching [2].

*Data collection procedures and methods of analysis.* The collection of empirical materials took place during the spring session of students 2019/2020 academic year, the processing of the results took place in September – October 2020, generalization and analysis – during November – early December 2020.

*Description of study samples.* The experiment involved students of 1–4 years of study of distance learning, who got the first (Bachelor’s) level of higher education, as well as students of 1–2 years of study of distance learning, who got the second (Master’s) level of higher education (field of knowledge 01 Education / Pedagogy) and

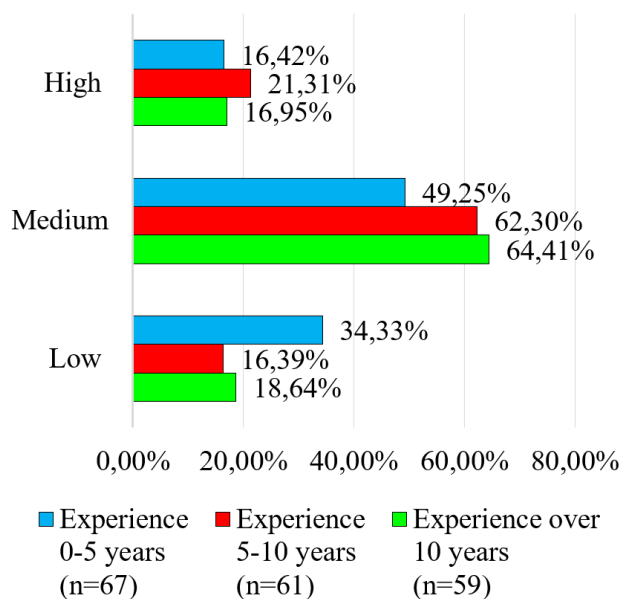
study in the specialty 012 “Preschool Education” in Hryhorii Skovoroda University in Pereiaslav and The Bohdan Khmelnytsky National University of Cherkasy (Ukraine). The educational and professional training programs of both levels provide for the study of relevant subjects “Information Technology in Education”, “Fundamentals of Digital Media Literacy” etc. Given the specifics of the study, only part-time students were united in research groups not by course, but by experience in teaching (experience in the specialty) in order to determine what are the psychological factors influencing the ICT competences formation are prevalent depending on the acquired knowledge and their direct application in practice. The total number of students-practicing in teaching in preschool institutions selected for the experiment was 187 ones. The first group consisted of those who had experience of professional activity from 0 to 5 years – 67 people, the second group – those whose experience is from 5 to 10 years – 61 people and the third – those who had over 10 years of experience – 59 people.

The determination of research groups in accordance with the term of experience together with the process of getting education (Bachelor’s and Master’s degrees) was carried out taking into account that: during 5 years of professional activity the teacher gains experience, learns to evaluate his/her own results; from 5 to 10 years there formation of individual style of pedagogical activity takes place and professional maturity increases; those who have over 10 years of experience, as a rule, start to achieve professional skills and high professionalism.

### **4 Results of research of the influence of psychological factors on the individual's ICT competence formation**

Based on the results of the written survey “What is your personal need for the ICT competence formation in professional activity?” from the participants of the survey ( $n=187$ ) it was found that all forms are completed and the available data can be analyzed quantitatively and qualitatively. All quantitative results of the influence of psychological factors (reflexivity, motivation, sociability) at the level of ICT competence formation in part-time students who are teaching in preschool educational establishments are presented in figures 1-3. Thus, figure 1 presents quantitative indexes of the *reflexivity* impact (analysis of the questions of the first block of the questionnaire) at the level of ICT competence formation.

As it is presented in figure 1, the influence of the psychological factor of *reflexivity* at the level of ICT competence was recorded with the following results: respondents of the 2nd group had a *high* level (work experience – 5–10 years), namely 21.31% ( $n=13$ ), in second place were those who were in the 3rd group (working in the specialty for over 10 years) – 16.95% ( $n=10$ ) and with a slight lag behind them were the representatives of the 1st group (work experience – 0-5 years) – 16.42% ( $n=11$ ). Part-time students of high-level were widely aware of the use of ICT in their professional activities. They were focused not only on the formation of computer literacy, but



**Figure 1.** Quantitative indexes of the influence of the psychological factor reflexivity at the level of ICT competence formation

also on the development of the ability to make optimal decisions in difficult situations, the development of skills and abilities to work independently on the processing of educational and scientific information, self-control etc. Their reflexivity is manifested in the high ability to analyze their own capabilities of ICT usage. They constantly carry out the process of self-knowledge, which is manifested in adequate self-esteem. Their attitude to the problems that arise during the acquisition of ICT are constructs. They comprehend them and make the right conclusions. The decrease in the high level of the respondents of the 3rd group compared to the 2nd group was unexpected, which is explained by the growth of the number of medium-level respondents from this group and their weakening of self-analysis due to large work experience.

The most significant indicators of the impact of reflexivity were found at the *medium* level of ICT competence. A significant number of such respondents were those who were in the 3rd group (experience over 10 years) – 64.11% (n=38), a small decrease (-2.11%) was recorded in the subjects of the 2nd group (experience of 5-10 years) – 62.30% (n=38) and the least of those who had an average level in the 1st group (experience of 0-5 years) – 49.25% (n=33). It is typical for them only in case of necessity, as they answered to the questions in the questionnaire, to reflect on their own results in terms of knowledge in the field of ICT and their application in real practice of working with children in preschool education. They self-assess their achievements or miscalculations in the possibilities of using ICT when an urgent situation arises, although they operate such skill quite well. These respondents periodically identify the reasons for the decrease in their own activity in finding information about information resources and their implementation in their professional activities. The results demonstrated that the influence of the psychological factor

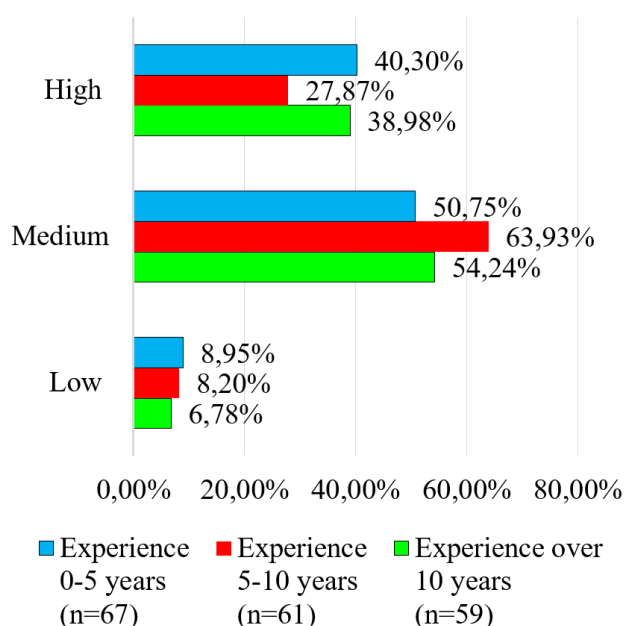
of reflexivity tended to increase due to the increase in the length of students' working experience.

The *low* level in the largest quantity was diagnosed in the 1st group of respondents (experience from 0 to 5 years) – 34.33% (n=23), almost halved the number of those who had such a level in the subjects of the 3rd group (experience over 10 years) – 18.64% (n=11) and in the 2nd group (experience of 5–10 years) – 16.39% (n=10), which is even (-2.25%) less than in the respondents of the 3rd group. Respondents who had a low level are characterized by insufficient analysis of the implementation of ICT, they do not care about the lack of knowledge or lack of personal experience in such area of professional activity. However, when it came to personal needs, such as the mobile applications usage, they replied that they self-analyzed their own knowledge and skills, giving them self-assessment and identifying gaps that required improvement. Thus, the influence of reflexivity of ICT competence formation had the dynamics of virtually direct dependence on the teaching experience. This is due to the ability to comprehend and analyze their interactions with participants in the educational process, to draw the right conclusions, to self-regulate behaviour, which has been developing over the years of pedagogical practice.

Thus, according to the results of the experiment, there is an increase in the psychological factor of reflexivity in the ICT competence formation in part-time students who had experience of more than 5 years (2nd and 3rd groups). This is due to the more developed over the years of pedagogical practice the ability to comprehend and analyze their interactions with participants in the educational process. Respondents with little experience (up to 5 years) – the 1st group were less able to reflect and draw the right conclusions.

*Motivation* was also studied as a psychological factor influencing the ICT competence formation. Figure 2 presents quantitative indicators of the impact of motivation (analysis of the second block of the questionnaire) at the level of ICT competence formation in part-time students of specialty 012 “Preschool Education”.

According to the figures given in figure 2 it is understandable that the results of the influence of the psychological factor *motivation* on the ICT competence formation in subjects with different lengths of teaching experience in most cases are distributed between medium and high levels. Respondents who have *high* level, they are 40.30% (n=27) from the 1st group (experience up to 5 years) and 38.98% (n=23) – from the 3rd group (experience over 10 years). At the same time, comparable with these groups, such respondents are less in number in the 2nd group (experience of 5-10 years) – 27.87% (n=17). In their answers, respondents of high-level identified that it is extremely important to persistently search for innovative information tools in working with children, to intensify their own cognitive activity by studying in additional courses, which requires considerable willpower. Therefore, they have a high level of motivation to improve their ICT competence formation and thus work on self-improvement. This is most typical for the respondents of the 1st group, who as young specialists strive to establish themselves in the profession



**Figure 2.** Quantitative indexes of the influence of the psychological factor motivation at the level of ICT competence formation

as much as possible. This is also true for part-time students with over 10 years of experience, who, having experience, are able to regulate their own ambitions, but are constantly working to improve their own professionalism. The decrease in the number of respondents with a high level in the 2nd group was an unexpected result (due to this the number in medium level increased), which can be explained as follows: having some professional achievements, these respondents believe that they can use traditional ICT in their own activities without excessive effort in finding new things.

As in the diagnosis of the reflexivity influence, the most significant indicators of the psychological factor motivation are found at the *medium* level of ICT competence formation. In particular, the largest number of such respondents – 63.93% (n=39) were representatives of the 2nd group (experience of 5–10 years), the dynamics of reducing this indicator to 54.24% (n=32) was recorded in the subjects of the 3rd group (experience over 10 years) and even lower – 50.75% (n=34) in those who were in the 1st group (experience from 0 to 5 years). Thus, the recorded facts demonstrate that the influence of motivation as a psychological factor in the ICT competence formation at the average level increased in respondents of the 2nd group, but decreased in the subjects of the 3rd group, compared with quantitative indicators in the 1st group. Respondents defined their attitude to the implementation of modern guidelines for the use of ICT as “desire when the need arises”. Motivation increases with the getting experience, when a certain stage of professional growth takes place. The subjects, who had an average level, noted that they have sufficient ability to arbitrarily regulate their own behaviour when a situation of nervous tension arises, but the motive to gain new knowledge and new experience in

the use of ICT. In part, they seek for help from colleagues because support is important to them.

The *low* level was recorded in 8.95% (n=6) of respondents from the 1st group (experience of 0–5 years), almost the same as the previous ones – 8.20% (n=5) in the subjects of the 2nd group (experience of 5–10 years) and the lowest of all – 6.78% (n=4) in those who were in the 3rd group (experience over 10 years). Their low motivation was due to the lack of necessity to look for innovative approaches in the application of ICT, as well as effective tools for their use in their own professional activities. For those who belong to this group, it is difficult to regulate their behaviour arbitrarily. They noted it in the answers to the questionnaire, noting that being absorbed by one type of work, they do not think about the need to synthesize it with ICT.

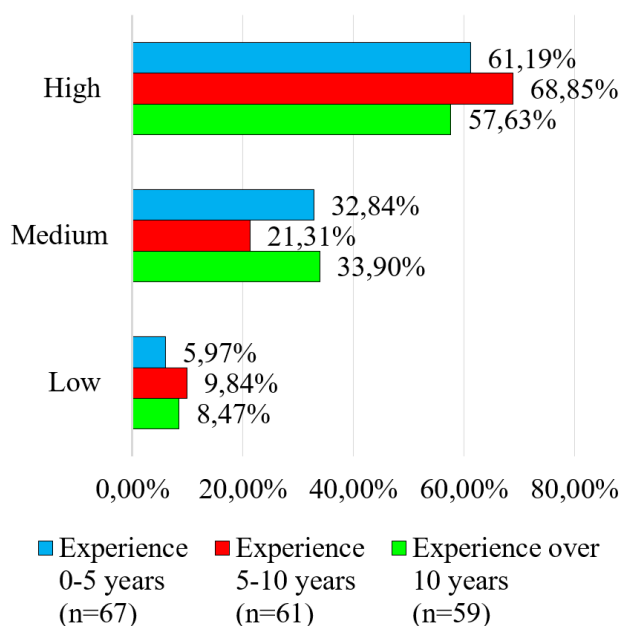
In general, it can be concluded that motivation is manifested mainly at high and medium levels in the ICT competence formation. The number of respondents with a low level is insignificant and practically does not differ significantly among respondents of all three groups.

The question of clarification the influence of *sociability* as a psychological factor in the ICT competence formation deserved attention. Figure 3 contains quantitative indicators of the impact of sociability (analysis of the questions of the third block of the questionnaire) at the level of ICT competence formation in part-time students.

The data presented in figure 3, displays that more than half of the all three groups being under study had a *high* level of ICT competence in relation to the influence of the psychological factor sociability. The largest number of respondents of this level was recorded in the 2nd group (experience 5–10 years) – 68.85% (n=42), followed by the 1st group (experience 0–5 years) – 61.19% (n=41) and the least was in the 3rd group (experience over 10 years) – 57.63% (n=34). They are focused on mobility and friendliness in relations with others, seek to discuss and jointly search for innovations in the use of ICT, openly express their positions and take into account the suggestions and values of colleagues. The influence of sociability is manifested in a positive attitude to the use of creative ideas in the joint projects creation (for example, it is recorded in the answer: “When the “Educational Bridge” was held between the preschool institution with which the cooperation agreement was concluded, the video broadcasting service Zoom and Google Classroom were used jointly”). Thus, the presence of sociability eliminates or minimizes the possible conflicts with others and promotes activation in the technological presentation of their own professional activities. However, in the 3rd group, comparable to the 1st and 2nd, the high level decreased, due to an increase in the number of respondents with the medium level. The reason for this, as it turned out, was a certain weakening of contact with colleagues due to the creation of their own files of information resources.

The *medium* level of ICT competence in relation to the influence of sociability as a psychological factor was demonstrated by the largest number of respondents in the 3rd group (experience over 10 years) – 33.90% (n=20), almost the same was recorded in the 1st group (experience





**Figure 3.** Quantitative indexes of the influence of the psychological factor sociability at the level of ICT competence formation

of 0–5 years), which is 32.84% ( $n=22$ ) and the least in the 2nd group (experience of 5–10 years) – 21.31% ( $n=13$ ). These respondents have developed the ability to communicate and establish contacts with participants of the educational process, however, it happens that they are not always able to convince them in the correctness of their own position. They easily establish trusting professional relationships, creating an atmosphere of creativity and ease. In the answers to the questionnaires, they noted that despite of the fact that they can do it easily, they do not often demonstrate initiative in the use of ICT in professional activities. Having their own achievements do not seek to technologically present their own developments in the use of ICT.

The *low* level is typical for 9.84% ( $n=6$ ) respondents from the 2nd group (experience 5–10 years), 8.47% ( $n=5$ ) of the subjects of the 3rd group (experience over 10 years) and 5.97% ( $n=4$ ) from the first group (experience 0–5 years). As we can see, the highest percentage is recorded in the 2nd group, it is obvious that due to self-affirmation in professional activities and the available little life and professional experience there is an overestimation. Representatives of the 3rd group had similar results, which probably testify to their excessive confidence in the correctness of their own positions. Respondents of the low level only situationally make contacts, dominate in their preferences, despite of the opinion of other participants in the educational process, demonstrate their own ambitions. As they indicated in the answers to the questionnaires, they do not spend time discussing non-standard creative approaches, but use information and software tools according to a pattern. They are characterized by avoidance of technological presentation of their experience in the ICT competence formation.

Thus, communicativeness as a psychological factor in the obtained quantitative indicators has the greatest impact on the ICT competence formation in part-time students working in the specialty. No significant difference in indicators according to length of working experience was found. A slight difference in the growth of the high level and the decrease of the average was recorded among the respondents of the 2nd group, which should be interpreted as a fact of self-affirmation in pedagogical activity and achievement of professional maturity.

Thus, the study of the influence of psychological factors: 1) reflexivity; 2) motivation; 3) sociability in the ICT competence formation of the studied groups showed that the third dominates the most, and the first two were with average data. According to the results of the survey analysis, some dependence of the gained experience of pedagogical activity in accordance with the definition of the role of psychological factors of the studied phenomenon is established. In particular, for the 1st group (experience 0–5 years) the most important were motivation and sociability, for the 2nd group (experience 5–10 years) – reflexivity and sociability, and for the 3rd group (experience over 10 years) – reflexivity and motivation. The obtained data represent only a limited sample of participants in the empirical study from part-time students on speciality 012 “Preschool Education” from 2 Ukrainian universities, so the results cannot be generalized, and the study of the scientific problem will be carried on.

## 5 Conclusion

1. Due to the fact that the problem of readiness of the educational system specialists, and first of all, its first component – preschool education, scientists emphasize the urgent necessity to form ICT competence as a necessary condition for professional stability, orientation in the information space, development of the ability to operate data based on the application of modern ICT in accordance with the requirements of the labour market and for the effective performance of professional duties.
2. Professional training of preschool education specialists includes the ICT competence formation as a multifaceted psychological phenomenon, due to the requirements of modern information society, which requires a competitive, mobile and competent professional, able to creatively and unconventionally solve problems of educational process, ready to apply innovations in their own pedagogical activities in the conditions of a modern preschool educational institution. Important components in the ICT competence formation of students on speciality 012 “Preschool Education” provide knowledge about ICT, development of skills in their application, stimulating interest and desire to seek innovation, supporting the desire for practical testing of creative ideas in the information space. It determines the personal component in the structure of ICT competence. Accordingly, ICT competence

in the study was considered as an integral quality of personality, which determines its ability to navigate in the modern dynamic information space and accumulate a system of special knowledge, skills and abilities that have a direct impact on the formation of individual's information and communication consciousness, development of communicative qualities and implementation of creative approaches in the use of ICT in the conditions of work in the preschool educational institutions.

3. In the process of developing conceptual positions it is taken into account that ICT competence of students who study part-time (Bachelor's and Master's levels) and are already specialists in preschool education has specific features. It is related to the fact that they implement personal, professional, informational, communicative and technological potentials comprehensively. Based on the theoretical substantiation, the following psychological factors influencing the ICT competence formation, in particular, reflexivity, motivation, sociability, which contain the following basic constructs (two for each of them): cognitive, operational, value, volitional, conative, creative. These constructs were taken as a basis in determining the criteria for the ICT competence formation. These are outlined: cognitive-operational, value-volitional, conative-creative with appropriate indicators for each. The total synthesis gave grounds to characterize the levels of ICT competence formation: high, medium, low.
4. An empirical study of the influence of psychological factors on the ICT competence formation on the basis of a written survey of respondents allowed to determine the essential dominance of each of them, namely: reflexivity, motivation, sociability in each of the study groups, which included part-time students according to the length of professional activity. Indicators of the impact of reflexivity and motivation were at the medium level, and sociability – at a high level – in all groups of subjects (1st – from 0 to 5 years; 2nd – from 5 to 10 years; 3rd – over 10 years). In conclusion, we see the need to increase the influence of the first two psychological factors at the level of ICT competence formation.
5. Thus, in the ICT competence formation emphasis should be shifted, first of all, to determine the psychological basis of the studied phenomenon, taking into account the formation of information and communication self-awareness, developing students' ability to use acquired knowledge of modern ICT, which will enrich their professional experience. The high level of ICT competence will distinguish an individual, from others as the one who feels confident in the boundless, dynamic, constantly changing world of information and has such qualities as mobility, purposefulness, persistence, adaptability, ability to quickly update their knowl-

edge and generate new ideas, constructively solve difficulties and work productively in a team. It is these qualities that ensure the competitiveness of preschool education professionals in the labour market, a comfortable existence in the information society, successful self-realization and generally increase the level of professional growth.

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# Conceptual model for a study of emotional health of the young people in the conditions of the coronavirus pandemic

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**Abstract.** The article reports the results of study of the psychological aspects of the emotional health of the youth in educational process in the coronavirus pandemic conditions. In recent years, the psychological aspects of the personality emotional health are widely studied. In the last studies emotional health is considered on the base of individual characteristics of personality, such as anxiety, aggressiveness, etc. In the presented work the most representative factors linked to the quarantine influence on emotional sphere of personality are taken into account. We ascertain that there are not only negative but also positive tendencies in the influence of pandemic conditions on the emotional state of people. In this work, a conceptual model for the step-by-step study of the psychological aspects of emotional health is proposed. In the process of this study such psychological components of an emotional health as ontogenesis, emotiogenicity, significance, and severity are introduced. The emotional state of students is an important factor determining the effectiveness of the educational process. Accounting for the emotional state can be carried out on the basis of various approaches. This paper focuses on the psychological aspects of the emotional health of students in pandemic conditions.

## 1 Introduction

The challenges that faced humanity at the end of 20th century influenced significantly on the emotional state of people. The world has found itself in new conditions associated with the processes of globalization, sharply increased flows of information, military conflicts, environmental and man-made disasters. The global pandemic (COVID-19) that is spreaded to hundreds of countries was also superimposed on all these processes [1–5].

It is clear that long-term quarantine restrictions have had negative impacts on the psychoemotional state of people. Scientists and social workers of many countries state significant increases in stresses, family conflicts, and suicidal cases last year [6–12]. The problem of emotional health of people who have contracted coronavirus and are undergoing treatment or have recovered yet unexplored enough.

Some authors indicate that along with emotionally negative effects the positive ones also occur during the quarantine period. These data are summarized in table 1 [13–17]. The quarantine restrictions associated with the transition to distance learning seriously affect the emotional state of students. For example, an excessive use of gadgets leads not only to stressfulness but also to emotional addiction. These effects require in-depth study especially in pandemic conditions.

It is important to know how stable the emotional changes and how they manifest in the educational process. Now it is relevant to provide special studies not only to reveal undesirable effects in emotional health, but to search

for corrective and preventive measures to improve and to stabilize it.

Manifestation of negative and positive effects in the emotional sphere of the personality in conditions of quarantine:

- Positive:
  - Emotional activation of people to achieve life goals
  - The emergence of a more attentive attitude of the person to his emotional state
  - The inclusion of physical exercise in the individual's daily schedule, etc.
  - Activation of volitional efforts to find effective ways to overcome conflicts
  - The emergence of useful experience in adjusting the intended goals, taking into account the complicated circumstances
  - Reassessment and rethinking of life values
  - Increased attention of the individual to his spiritual development etc.
- Negative:
  - The emergence of negative emotional states in the form of anxiety, frustration, depression, of unfounded experiences
  - Increase of emotional sensitivity to the stressful and post-stress states
  - Emergence of emotional Internet addiction
  - Manifestation of emotional discomfort linked to weight gain

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- Emergence of emotional instability in overcoming different conflicts
- Manifestation of inadequate self-esteem against the background of emotional stress
- Manifestation of emotional exhausting from various restrictions, etc.

At present, the ideas of emotional health from the standpoint of mental phenomena have not been considered on the serious level. The analysis of different views concerning the problem of the psychological aspects of emotional health has showed the need to build a conceptual model for its study. In this work we do an accent on the case of the emotional state of students in the conditions of the coronavirus pandemic. Wherein, we proceed from the consideration of an emotional health from the standpoint of mental phenomena.

## 2 Methods and materials

In the study, the authors proceeded from the fact that the influence of psychological factors on the emotional health of a person is significantly manifested in extreme conditions.

Research concerning the psychological aspects of students' emotional health is especially important. It is this age of people that determines the successful formation of their emotional maturity. It is necessary to study the psychological reactions of young people to extreme situations, which of course include the COVID-19 pandemic. In the mainstream of our research, it becomes possible to establish a connection between emotional maturity and the manifestation of psychological characteristics that determine the emotional health of students. It is natural to assume that the level of emotional maturity significantly determined psychological characteristics and the emotional health of young people.

The COVID-19 pandemic certainly belongs to such conditions. Therefore, a test questionnaire was drawn up to conduct an experiment with students, which was supposed to show which psychological characteristics of the personality are most affected by the conditions of the pandemic. The research was carried out in three stages.

### 2.1 Description of research scheme

At the first stage, a special course was developed to familiarize students with the main psychological components of emotional health, since such a discipline is not provided for in the curriculum.

The course generalizes the understanding of emotionally mature personality. Low level of emotional maturity is characterized by the absence or insufficient formation of emotional reactions to the world around. The essence, content and structure of emotional maturity are considered as an integrative quality of personality, which characterizes the degree of development of the emotional sphere at the level of the adequacy of emotional response in certain socio-cultural conditions. The concept of emotional

health is understood in connection with psychological factors that determine it. Each of the psychological components of emotional health, integrating with other properties and processes, is reflected on both the conscious and subconscious levels of the human psyche.

The psychological components of personality's' emotional health affected by the pandemic COVID-19 are characterized.

This first stage was intended to help students to understand and answer the testing questions.

At the second stage, a testing experiment was carried out on the basis of a compiled questionnaire. The questionnaire consisted of 40 questions. Here are some examples of these questions: *“Has your overall emotional health changed as a result of the COVID-19 pandemic?”*

*Do you notice a gradual change in your emotional health during the quarantine?*

*Do you notice the influence of hereditary factors on the change in your emotional health during the quarantine?*

*Are there any distinctive features of the influence of various destructive factors and stresses on your emotional health due to the pandemic?*

*What psychological components of your emotional health have been most affected by the pandemic (emotional stability, anxiety, depression, etc.)?*

*Has your performance changed during the pandemic?*

*Has the emotional perception of lectures changed in the course of online learning?*

*How did the quarantine regime affect your attitude towards colleagues?*

*How has the quarantine regime affected your attitude towards your friends?*

*Did you manage to do anything significant in your work or creativity during the quarantine?*

*Have you noticed changes in the behavior of the people around you during the quarantine?”*

At the third stage, the test results were analyzed, and thus it was revealed which psychological components of emotional health, based on the data obtained from the respondents, are most susceptible to the impact of the conditions of the COVID-19 pandemic.

It can be assumed that these components are significant in the study of the emotional health of a person. Taking into account also existing ideas in this area of [18–21], a conceptual model was developed for a study of the psychological aspects of the emotional health of a person.

### 2.2 Description of experiment and results

Students of the Faculty of Psychology of South Ukrainian National Pedagogical University named after K. D. Ushynsky participated in the research. The research group was represented by 123 students aged 17–24 years old (42 – boys, 81 – girls). After completing the course “Psychological Foundations of Emotional Health”, specially read to students to prepare them for the experiment in the classroom conditions, students were asked to answer testing questions [22].

The students had ample time and favorable conditions to thoughtfully answer the questions.

**Table 1.** Test results of the testing experimental group of students

The main psychological components of students' emotional health affected by the pandemic COVID-19	Percent of students
Hereditary factors	31
Depressive states	30
Emotional stability, a sense of comfort, well-being	25
Self-regulation capabilities, training effectiveness, recreational and recovery abilities	14
Emotional addictions, emotional deviations	10

Due to quarantine restrictions, the study was carried out online.

The results of testing are presented in table 1. In Table 1 one can see that students turned out to be distributed in a certain way with respect to the influence of psychological factors on their emotional state during a pandemic [23].

The test results showed that respondents consider hereditary factors and possible depressive states to be the most susceptible to the influence of the conditions of the pandemic. Emotional deviations characteristic of a given personality change insignificantly. It also found that differences between these changes for boys and girls are hardly noticeable. In the case of boys, this influence is more pronounced [24].

Table 1 shows how students are distributed depending on the influence of various psychological factors on their emotional state in connection with pandemic conditions. These results focus on the importance of taking certain psychological aspects into account in the study of emotional health.

### 3 Results

Based on the test results, as well as on publications [22–24], we have developed a conceptual model for the study of the psychological aspects of the emotional health of a person.

Part of the research in the framework of this model is already underway.

However, it is supposed to use this model for a comprehensive and versatile study of psychological aspects of the emotional health of a person in the future.

#### 3.1 Description of the model

The model for studying the influence of various psychological components on the emotional health of a person was formed on the basis of the test results and analysis

of the literature available in this area. Emotional health is considered as a state of the sensory sphere of personality, which changes from the positive to the negative state.

There are a wide range of psychological characteristics of the emotional sphere of a person. By the degree of importance (i.e., their role in determining the emotional health of an individual) they can be arranged in the conditional scale from the maximum positive to relatively negative characteristics, which even lead to certain deviations from the normal state. Such a scale will be formed in the course of the further research based on the proposed model (figure 1).

The proposed model includes five areas of research.

At first, it involves taking into account the age-specific characteristics of the emotional sphere of the individual.

The second direction includes factors that affect the emotional health in connection with physiological features of a person in various conditions of activity. The factors in this case depend on the inherited features of emotional health, as well as diseases and physical trauma. Also, here we refer to studying a special class of stresses arising from changes in social conditions (conflicts, psychogenic circumstances, including catastrophes, epidemics, etc.).

The third direction is “Specific properties and states characterizing emotional health”. This includes such properties as emotional stability, emotional maturity, etc. and such states as emotional exhaustion, anxiety, emotional ambivalence, depression, etc.

The fourth direction “Some features of the not usual emotional state” includes emotional accentuations (emotional infantilism, emotional deviations, etc.).

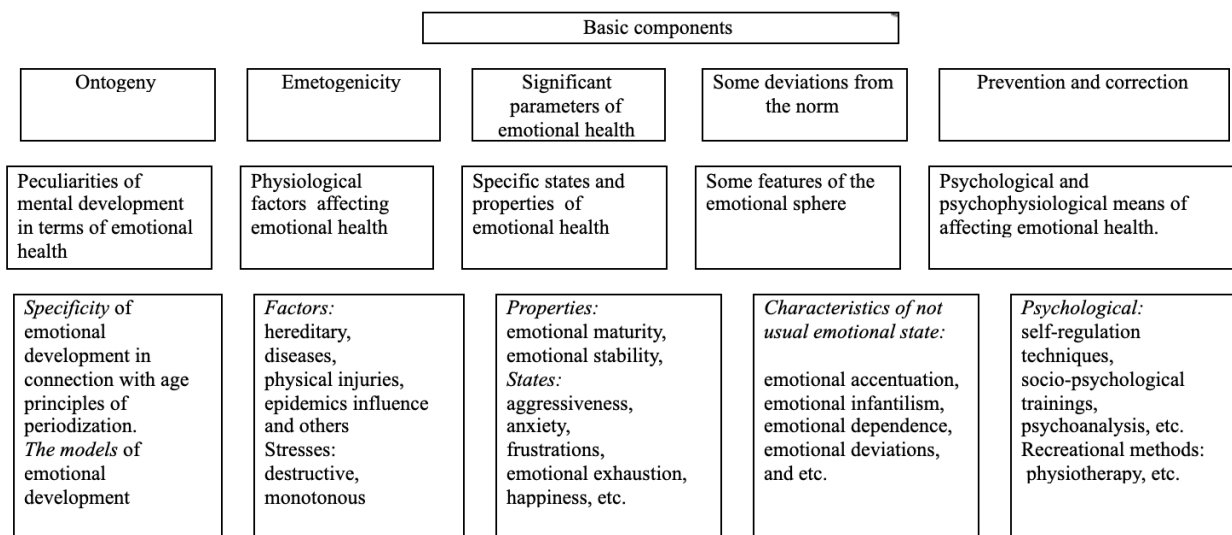
The fifth direction (search and development of corrective methods) includes psychological and socio-psychological techniques and training.

These five directions (figure 2) are partially reflected in works [11, 25–29], however, they are detailed and modified in the presented model.

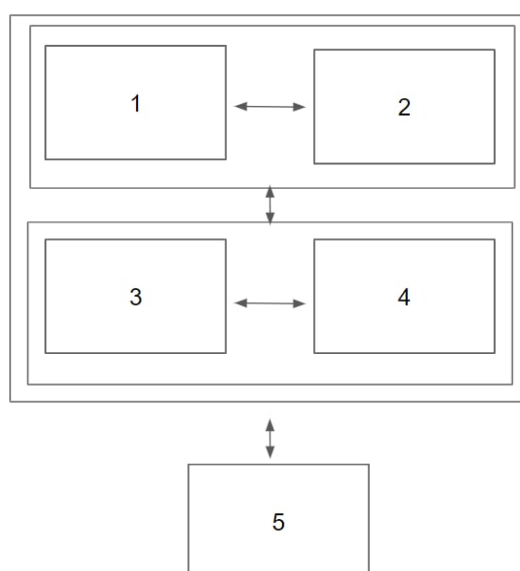
We included these five areas of research in our model, based on the students’ test results and taking into account their age features. At this age, the influence of external conditions on the psychological state of the individual is most pronounced. At the same time, we proceeded from research that is already being carried out in some of the indicated directions. It is clear that in the future, in the process of implementing this model, branches of these directions may appear and new ones may arise. However, the proposed model will serve as the basis for a broad study of an important problem related to the psychological aspects of the emotional health of an individual.

It is understood that a study of emotional health should be carried out in parallel at the neurological, psychiatric and other levels [17, 30, 31]. Using these additional results will provide to solve more problems connected with psychological aspects of emotional health.

In the description of emotion one focuses primarily on emotion as a reaction. However, to account fully for emotional nature, it is necessary to understand the chain of events that leads up to this reaction. They include processing and interpreting external (visual, auditory or other types of perception) and internal (thought) stimuli. An-



**Figure 1.** Conceptual model of a time-phased study of psychological aspects of emotional health



**Figure 2.** A scheme for coordination of research in five directions

other important aspect of emotion that goes beyond emotional reaction is emotional understanding, which refers to our ability to recognize emotions in ourselves and in others. In general, both aspects determine the emotional state and emotional health of an individual [29, 32].

A thorough understanding of emotions in neurological disease will need to take into account different aspects of emotional state, and different types of emotions. Emotional models that identify the psychological and neuroanatomical processes of the emotional system have been already developed and should be used in future studies. An important question for example is an understanding of the ways in which emotional systems are disturbed with brain

injury. It is necessary to underline the organizing functions of emotion, and understand that emotions are multifaceted responses involving thoughts, visceral sensations and facial and bodily reactions.

When emotions are strong, these reactions can occur very quickly, and in a coordinated fashion. This allows emotions to be implemented efficiently in response to critical situations. Some aspects of emotion are innate, and some are more variable across individuals. It is understood that a study of emotional health should be carried out in parallel at the neurological, psychiatric and other levels [18, 30, 31].

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Another important aspect of emotion that goes beyond emotional reaction is emotional understanding, which refers to our ability to recognize emotions in ourselves and in others. In general, both aspects determine the emotional state and emotional health of an individual [24 - 25]. A thorough understanding of emotions in neurological disease will need to take into account different aspects of emotional state, and different types of emotions. Emotional models that identify the psychological and neuroanatomical processes of the emotional system have been already developed and should be used in future studies. An important question for example is an understanding of the ways in which emotional systems are disturbed with brain injury.

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responses involving thoughts, visceral sensations and facial and bodily reactions. When emotions are strong, these reactions can occur very quickly, and in a coordinated fashion. This allows emotions to be implemented efficiently in response to critical situations. Some aspects of emotion are innate, and some are more variable across individuals.

A model of emotional processes must account for the fact that emotional reactions are typically adjusted to match situational demands. These processes, and other types of regulation, are important component of the brain's emotional processing systems, and may be particularly relevant to human emotional processing. The changes in all of the aspects of emotional functioning, including emotional reactions, emotion regulation, appraisal, emotional understanding, and empathy, are found in a number of neurological diseases. Therefore studies of neurological disease would be well served to consider the full range of emotional functioning.

The boundaries between the various aspects of emotional functioning can be blurry and the interactions among them are complex. The key brain regions are participating in multiple aspects of emotional functioning.

It is understood that a study of emotional health should be carried out in parallel at the neurological, psychiatric and other levels [26 - 30]. Using these additional results will provide to solve more problems connected with psychological aspects of emotional health.

## 4 Discussion

The presented model indicates a sequence of steps to research psychological components of emotional health. We conducted an experimental study of the influence of extreme conditions caused by the COVID-19 pandemic on the manifestation of psychological components of students' emotional health.

To obtain the most reliable data in the testing process, a preliminary stage of preparing students for testing was carried out, which consisted of developing a course of lectures "Psychological Foundations of Emotional Health" and mastering this course by students.

It is clear that under normal conditions the manifestation of the psychological components of emotional health may differ. However, it is important to know which of the above components are more and which are less sensitive to changes in environmental conditions. A personality is constantly in changing conditions. Stressful situations constantly arise in life. Therefore, the information obtained in our experiment provides an orientation towards the interaction of the main psychological components of emotional health in real life conditions

In these conditions, the psychological characteristics of a person are manifested, which characterize his emotional health.

The study of these features is important for solving many practical problems in human life.

At the same time, the psychological aspects of the emotional health of an individual in the specific conditions

of the COVID-19 pandemic are of independent interest. Research in this direction will continue.

Young adults have experienced a number of pandemic-related consequences, such as closures of universities and loss of income that may contribute to poor mental health. During the pandemic, a larger than average share of young adults) report symptoms of anxiety and/or depressive disorder. Compared to all adults, young adults are more likely to report substance use. Prior to the pandemic, young adults were already at high risk of poor mental health and substance use disorder.

## 5 Conclusion

1. Various aspects of the impact of the COVID-19 pandemic on the emotional health of people are discussed. It was emphasized that there are also positive factors of the effect of quarantine on the emotional state of people. These positive factors of the influence of extreme conditions on the psychological state of people, as a rule, are not taken into account. However, it is advisable to take them into account in the general assessment of the conditions of the pandemic
2. The questionnaire, designed to test students, was aimed at finding out how students feel the impact of the pandemic on their emotional state with an emphasis on psychological factors. Taking into account the age characteristics of the respondents and their increased sensitivity to extreme external conditions, the test results were used to construct a conceptual model to study the psychological aspects of the emotional health of an individual.
3. In the course of the research, special preparation of students for testing was provided. The research design included a preparatory stage, when a special course was read to students to prepare them for testing.
4. Analysis of the results of testing the respondents showed that the influence of the extreme conditions of the pandemic is felt to the greatest extent depending on hereditary factors and depressive conditions characteristic of a person. This result does not depend on the gender differences of the person. This result has an independent meaning and is the subject of further study. This does not depend on the gender differences of the person.
5. Emotional dependencies and emotional deviations of the personality do not undergo significant changes in a pandemic. This result also does not depend on the gender differences of the person.
6. The results of the experiment, as well as the results of other authors, formed the basis of the conceptual model. It is assumed that the proposed model will be used to conduct research in a wide range of psychological aspects of the emotional health of a person.

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# The introduction of the problem of personal identity in the university course of philosophy

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**Abstract.** The article considers the introduction of the problem of personal identity in the structure of the course of philosophy. The introduction of new material is the attempt to redesign the academic course of philosophy, simultaneously keeping its traditional structure. The problem of personal identity is a topical issue in analytic philosophy. However, it is not much learnt in Ukraine, where academic circles mostly orient to continental philosophy. The paper analyses the subject area of personal identity: its metaphysical status, the nature and conditions of personhood, the possible criteria, and the method of thought-experiment. Then, it shows the steps of introducing personal identity in the course of philosophy. The novelty of the article is in the fact that the problem of personal identity is introduced for non-philosophy students for the first time at Ukrainian university course of philosophy.

## 1 Introduction

The problem of teaching philosophy at university is always one of the most topical among Ukrainian educators. For philosophy is a compulsory course for all students of the bachelor's programme, it is taught in all higher educational institutions in Ukraine. At Kryvyi Rih State Pedagogical University, philosophy is a compulsory course for non-philosophy students, who are in the second year of the bachelor's programme. Under the concept of non-philosophy student, we understand students who do not major in philosophy. For Kryvyi Rih State Pedagogical University prepares future teachers, but not professional philosophers, all students belong to this category. Philosophy plays an essential part in the formation of worldview, and therefore, great attention should be paid to it. The course of philosophy is taught for two academic terms. It includes two thematic parts. The first one outlines the history of philosophy from Ancient Indian, Ancient Chinese, and Ancient Greek philosophy to analytic philosophy of the twentieth century. The second part concerns the main problems of philosophy and its branches: metaphysics, theory of knowledge, philosophy of mind, philosophy of history, value theory, philosophical anthropology, etc. In the third year, the students can choose two other elective courses out of the following: aesthetics, ethics, cultural studies, religious studies, social and political philosophy, and logic. The master's degree students study one of these courses: critical thinking, philosophy of education, and philosophy of science. The choice of courses depends on the programme. For example, students, majoring in chemistry or biology, study philosophy of science, psychology students and education majors study the philosophy of education. PhD students also study the advanced course of

philosophy and the course called methodology and organization of scientific research.

For the course of philosophy is taught to all students of the bachelor's programmes in Ukraine, the problems of methodology and syllabus improvement are the most discussed at the departments of philosophy all over Ukraine. I. Bychko outlines the necessity to reconsider the syllabi of the course of philosophy taught at Ukrainian universities. He admits that some concepts and theories have not been reconsidered and updated since 1938. The author suggests excluding the following aspects from the syllabi: the themes concerning so-called "the basic question of philosophy" introduced by F. Engels; the way to present the history of philosophy through the opposition of materialism and idealism; the dialectical method as the main one, considering society, a person and nature. I. Bychko admits that the understanding of social problems and personhood should be reconsidered [1]. It is also essential to add new themes and problems to the course of philosophy.

T. Yashchuk notes that educators should bring innovation into the course of philosophy. The innovative course of philosophy should be based predominantly on modern philosophical discussions. It should include such systems as analytic philosophy, phenomenology, poststructuralism, post-Marxism, and others [2].

V. Ryzhko thinks the teachers should reconsider the structure of a modern course of philosophy. Firstly, it is necessary to introduce the theoretical part, including historical aspects and a description of the main philosophical categories. Then, the second part of the course should be devoted to the reading of the original philosophical texts and their discussion at the seminars [3].

In his papers [4, 5], I. Karivets shows the importance to design the course of philosophy, so that it develops re-

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flective thinking. According to the author, philosophical thinking comprises three stages: speculation, abstraction, and theory [5, p. 83]. A student, who gets through all these stages, starts perceiving the world as the complicated unity of interconnected processes and gains a fundamental theoretical worldview essential for the future professional life.

In their papers [6, 7], M. Maksiuta and O. Onyshchuk, outline the idea of the reconsideration of methods in philosophy teaching. O. Onyshchuk writes that the course of philosophy must be considered as propaedeutics to any field of knowledge. Therefore, students must not only learn the material but also develop their own beliefs in the truth of certain conclusions that must be elements of their spiritual world [7, p. 140]. This purpose can be achieved if the philosophy teaching meets these requirements: understanding the process of learning as a cognitive process aimed at the development of critical thinking and creativity; considering learning as the comparison of new information with already known; creating a psychologically comfortable environment; organizing the educational process as the acquisition of personal experience; taking into account the uniqueness of each student [7, p. 140]. K. Kyrylenko states that the peculiarity of philosophy is its systemic nature. It is possible to unite different themes in a single philosophical course, using the methods of active learning (projects, discussion, creative tasks, essay writing) [8].

Thus, the mentioned philosophers and educators show that the syllabus of the course of philosophy needs constant improvement. The focus should be on contemporary discussions and categories.

The introduction of the new material causes some methodological questions. That is the question about the content of new information, i.e. which information should be added and how to choose this new material. In Ukrainian universities, there is a strong tendency to introduce new philosophical discussions from continental philosophy.

But at Kryvyi Rih State Pedagogical University, the Department of Philosophy develops a philosophic approach based on analytic philosophy. Therefore, the material of the course should also be topical for contemporary debates in analytic philosophy, interesting for the students and connected with other topics in the course.

These criteria of the theme choice cause one more problem: the problem of its placement within the course. The course of philosophy presupposes the structure when the first part is devoted to the historical development of philosophy and the second one comprises metaphysics, philosophy of mind, theory of knowledge, philosophy of science, social philosophy, philosophy of history, value theory, and philosophical anthropology. The structure is traditional developed and being practiced for many years so it is difficult to redesign the course completely. Moreover, it presupposes 34 hours of lectures and 34 hours of seminars. The limitation of in-class hours does not allow either devoting a separate seminar to certain new debates or introducing much new material, as it will be information overload. Thus, the new material should be introduced within the existing structure. That raises a question about

the method of the material introduction. After consideration, we have chosen the problem of personal identity to be introduced in the structure of philosophy course.

## 2 Literature review and the problem statement

### 2.1 Personal identity in socio-cultural discourse

Who am I? What is meant to be a person? Does the word "I" refer to a body or a soul? How am I different from other people? While studying philosophy students may ponder over these questions. The professional philosophers would emphasize that these questions belong to the identity problem.

The notion of personal identity is in the focus of socio-cultural discourse. S. Hall admits that there has been "a veritable discursive explosion in recent years around the concept of identity" [9, p. 1]. E. Erikson notes that the concept of identity is so widely used that it seems to be understandable for everyone without any definitions [10, p. 15].

There are different approaches to personal identity in socio-cultural discourse. Psychologists consider it within the paradigm of self-concept and the formation of the self via socialization. W. James was the first who introduced this viewpoint. He considers that the self-concept of a person appears as the unity of distinguishes four constituents: the material self, the social self, the spiritual self, and the Pure Ego [11, p. 280]. The spiritual self and the Pure Ego are the concepts of the high level of abstraction. They are pure ability to think and the position from which a person deliberates. The material self consists of a body and property including clothes and houses. The social self means social recognition. W. James emphasizes that an individual can possess several social selves; the exact number of social selves equals the number of people, carrying an image of the individual in their consciousness [11, p. 280]. The people, who belong to one social group, share the same image of the individual. The number of social selves is the same as the number of social groups where the individual interacts.

C. H. Cooley introduces the theory of looking-glass self, in which he emphasizes that personhood is social in its nature. It emerges as a result of the interiorization of interaction with other people. The self as the unity of all social experiences contains three elements [12, p. 152]:

- 1) the imagination of a person's appearance to the other people,
- 2) the imagination of a person's judgment of that appearance,
- 3) the existence of self-feeling, for example, pride or mortification.

W. James and C. H. Cooley's ideas were developed by symbolic interactionists. G. H. Mead considers personal identity appears in the process of social interaction via the acquisition of symbolic systems and symbol exchange.

He distinguishes consciousness as the ability to be aware of emotional states and self-awareness as the fundamental property of the self when an individual considers himself or herself as an object. Self-awareness is also a product of society because the individual exists not only in a social group but also because he or she constitutes self from the experience of his influence on others. The self divides into two parts: “I” and “me”. “I” arises from experience and is based on memory. It is the ability to be aware of oneself as a subject, to ascribe certain experiences and feelings. “I” is the reaction of a person to social norms. “Me” is based on self-awareness, on a reflective appeal to oneself. These two components of the self do not oppose each other, and they do not reduce to each other. Their mutual dialectical influence results in the creation of personal identity as the unity of the self [13].

S. Stryker and P. Burke describe identity as the hierarchical entity of social roles [14, 15]. P. Burke distinguishes the following types of its components: (1) role-based identities, (2) group identities, (3) personal identities. According to this hierarchy of identities, self-verification and self-assessment take place [15, p. 112]. He pays special attention to personal identity which is the embodiment of culturally recognized traits, expectations of the individual.

According to H. Tajfel, identity may be defined as “the individual’s self-definition in a social context” [16, p. 68]. Social identity is the result of a long process that includes several stages: (1) social categorization, i.e. the analysis of the environment and the selection of essential social groups from the social space; (2) social identification, which is associated with the identification of the individual with the selected group; (3) social identity (a result of identification), which manifests in stable notions of belonging to a particular social group [16, 17]. Social identity is a cognitive construction, and it includes knowledge of social group membership, attitudes towards that group, and emotional significance about that membership [17, p. 15].

Therefore, in socio-cultural discourse the notion of personal identity is understood as the formation of the self and the attribution of social roles or self-definition to a social group.

## 2.2 The problem of personal identity in philosophy

According to the historical studies conducted by R. Martin and J. Barresi, the problem of personal identity goes back to Ancient Greek philosophy, as it was introduced by Plato and Aristotle as a part of their philosophical systems [18, p. 1]. R. Martin and J. Barresi, U. Thiel, and K. J. Seberger-Forstrom consider the historical aspects of the personal identity problem [18–20]. In papers [21–23], we have outlined the main periods of the personal identity problem. In this article, we present the key points of our study.

Although the personal identity problem has been developing since the classical period of Ancient Greek philosophy, it was regarded implicitly as a part of the other problems till Early Modern philosophy. Aristotle and Plato considered it in the context of the relation between a

soul and a body. In the Middle Ages, the personal identity problem was interpreted as the principle of individuation: a person remains the same as the unity of the same soul in one body.

T. Hobbes is one of the first in the Early Modern philosophy, who explicitly formulates the problem of personal identity. He outlines this notion in his well-known paradox about the ship of Theseus. However, the analyses it in Aristotelian terms of matter and form, adding the scholastic principle of individuation [24]. For R. Descartes, personal identity is cogito. A person remains self-identical because he or she continues thinking. For thinking is an attribute of immaterial substance, the problem of personal identity can be understood as the problem of the same immaterial substance. This view is close to the medieval notion of the sameness of person as the unity of the body and the soul. So Descartes does not pioneer in the development of personal identity problem [25].

However, Cartesian philosophy concerning the self, innate ideas, and mind-body dualism makes J. Locke develop his empirical theory of knowledge, where the problem of personal identity arises explicitly in a new perspective as an essential part of epistemology and metaphysics. In Chapter 27 of “An Essay Concerning Human Understanding”, J. Locke grounds unsubstantial theory of personal identity. The philosopher distinguishes three sorts of substances: God, finite intelligences (spirits or angels) and bodies [26, p. 183]. The last category includes things (a mass of matter), plants, animals and a person. Plants and animals keep their identity if they continue their life, and their organism consists of the same parts.

Then, J. Locke states that a man and a person are two different ideas; they have different principle of identity. A man is a continued life in “a living organized body” [26, p. 187]. The principle of identity of a man is the same as for an animal or a plant. However, he defines a person as “a thinking intelligent living that has a reason and reflection, and can consider itself as itself, the same thinking thing in different times and places; which it does only by that consciousness which is inseparable from thinking and, as it seems to me, essential to it: it being impossible for anyone to perceive without perceiving that he does perceive” [26, p. 188]. A person is also “a forensic term appropriating actions and their merits, and so belongs only to intelligent agents capable of a law, and happiness and misery” [26, p. 198]. It means a person is not a substance, but an agent, the subject of an action and thoughts. An agent can perceive, ascribe actions and thoughts, and remember them. An agent is accountable for ascribed actions. If a person can do that, he or she is conscious. Thus, consciousness becomes the criterion of personal identity. The philosopher emphasizes: “Nothing but consciousness can unite remote existence into the same person” [26, p. 196]. The substance, material or immaterial, is not able to do that. J. Locke’s theory of personal identity influenced the development of philosophical thought in Early Modern philosophy. After J. Locke’s book, G. W. Leibniz, J. Butler, T. Reid, D. Hume, and I. Kant analysed this problem in their philosophical treatises.



G. W. Leibniz develops an ethical view on personal identity. He states that a person is not just a rational creature, but a subject of moral responsibility [27]. T. Reid distinguishes identity in general and personal identity as two different categories. He defines identity in general as “a relation between a thing which is known to exist at one time, and a thing which is known to have existed at another time” [28, p. 201]. This definition implies the idea of persistence over time or, as he puts it, “an uninterrupted continuance of existence” [28, p. 201]. Personal identity supposes the idea of persistence of a person over time and the notion of this uninterrupted existence reflected in the consciousness of this person. Thomas Reid emphasizes that personal identity is “the continued existence of that indivisible thing which I call myself” [28, p. 203]. That means personal identity is the question of the continuation of the self over time. In other words, the category of personal identity explains why a person who existed yesterday is the same as that person, existing today, and why today’s person will be the same as tomorrow’s one. J. Butler and T. Reid introduce essential critical remarks on the personal identity problem, for example, the problem of circularity of consciousness, which is one of the prominent topics in analytic philosophy, especially for S. Shoemaker and P. Grice. D. Hume describes eliminative approach to the self, saying that the self is not a single unity or a structure, but “the bundle or collection of different perceptions” [29, p. 165]. The contemporary philosopher D. Parfit uses Hume’s conception of the self as one of the sources of for his non-reductionism.

I. Kant considers personal identity ethics. The philosopher views a person as a moral agent, a source of responsibility and obligations [30]. Kantian philosophy affects considerably the contemporary discussion of the problem of personal identity: C. Korgaard’s monographs and articles are an example of a neo-Kantian theory of personal identity [31–33]. After I. Kant, the interest in the problem of personal identity slightly decreased.

In the 20th century, the problem has returned in the focus of philosophical discussion in analytic philosophy. In 1941, P. Grice introduced the neo-Lockean theory of personal identity [34]. After that, neo-Lockean approach was developed by S. Shoemaker, B. Williams, E. Olson and others [35–37].

In contemporary philosophy, the theories of personal identity may be divided into three main approaches: metaphysical, normative (ethical), and narrative. The metaphysical approach includes publications by P. Grice, S. Shoemaker, B. Williams, H. Noonan, R. Nozick, E. Olson and others [34–39]. H. Frankfurt, C. Korgaard, and C. Rovane develop normative or ethical approach [31–33, 40, 41]. M. Schechtman and K. Atkins consider the narrative approach to the problem of personal identity [42, 43].

How do philosophers formulate the problem of personal identity? E. Olson states it as the question of possible circumstances when a person existing at one time is identical with (or the same) as a person existing at another time? [44, p. 356]. E. W. Hall says that the personal identity problem presupposes the contradiction be-

tween numerical and qualitative types of identity. Numerical identity is the sameness in number, and qualitative identity is the sameness of properties. The contradiction appears when, for example, a person experiences some changes in character or behaviour [45, p. 88]. This person remains the same in number, but habits, tastes, thought, ideas, manners are completely different, and so we can say that a person isn’t the same. Thus, E. W. Hall tries to analyze what makes a person the same or identical over time: the same body or the same behaviour and experience. H. Frankfurt considers personal identity as the problem of the nature of a person and the conditions of personhood [40, p. 113]. That means every person shall be identical over time and identity is an essential feature, so there is no person without personal identity. For C. Korgaard, C. Rovane, and M. Schechtman, personal identity is the matter of personal identity is the process of constant re-identification of a person in narrative or interaction with other people [31–33, 41, 42].

### 3 The aim and the objectives of the study

The paper aims to show the problem of personal identity in the structure of the course of philosophy as its important part. The article has the following objectives:

- (1) to analyse the subject area of the problem of personal identity,
- (2) to show possible steps of its introduction in the course of philosophy.

### 4 The analysis of the subject area of the personal identity problem

The analysis of papers and monographs shows that the problem of personal identity consists of several aspects. Firstly, there is the question of the ontological status of personal identity: what kind of relation is personal identity and how to analyse it. Secondly, there arises a question of the nature and conditions of personhood. It explains why personal identity is essential for the existence of a person. The third aspect is the problem of identity criteria, i.e. the question about conditions and circumstances under which personal identity can exist over time. Finally, there is a methodological aspect of the study. Let us consider the components of the personal identity problem in details.

#### 4.1 The metaphysical status of personal identity

The metaphysical status of personal identity considers two possibilities of interpretation of the mentioned concept. In Early Modern philosophy and contemporary neo-Lockeanism, personal identity is considered as the relation between person-stages. J. Butler emphasizes that the identity ascribed to a person existing over time is the same relation that exists between two things. He states that personal identity should be understood “in a strict and philosophical” sense, i.e. the identity of a person is the same category

as logical identity [46, p. 319]. This category is symmetrical, transitive, and reflexive. Thus, if two stages of the person's being are symmetrical and characterized by reflexivity and transitivity, a person possesses self-identity. D. Parfit admits that identity as a formal category is the relation one-one and it does not have degrees: if it allows degrees, the relation between is not identity, but similarity. The author emphasizes: "Identity is all-or-nothing" [47, p. 11].

However, reflexivity and transitivity between two episodes in the life of a person can fail. T. Reid showed that in his famous thought-experiment about a boy, an officer and a general. Imagine a boy who robbed an orchard at school and who was flogged for that. Then, he becomes an officer and, being in the decisive battle, he takes the standard of the enemy. In the battle, he remembers that situation at school. After that, he becomes a general who remembers being an officer in the battle, but he completely forgets the episode when he was flogged at school for robbing an orchard. T. Reid concludes that the officer identifies himself with that schoolboy, but the general does not. The philosopher considers the following: "He who was flogged at school is the same person who took the standard, and that he who took the standard is the same person who was made a general [...] But the general's consciousness does not reach so far back as his flogging, therefore, according to Mr. Locke's doctrine, he is not the person who was flogged. Therefore the general is, and at the same time is not, the same person with him who was flogged at school" [28, p. 214]. Thus, the boy and the officer are two identical person-stages, as well as the officer and the general. However, there is no identity between the person-stages of the boy and the general.

B. Williams shows some contradictions, when we think of personal identity over time in his famous thought-experiment about Charles, Robert, and Guy Fawkes [36]. Imagine that a young man called Charles undergoes a change of character and memories, so his original personality vanishes. He starts believing that he is Guy Fawkes, a participant of the Gunpowder Plot in 1605. Charles has got the same memory, manners, and behavioural patterns as Guy Fawkes. Is it possible for two people, Charles and Guy Fawkes, to be the same person? If we assume that Charles is identical to Guy Fawkes, the thought-experiment goes to the second stage. Another person, called Robert, undergoes the same procedure of character change, so he also receives the personality of Guy Fawkes. Thus, Charles and Robert identify themselves with Guy Fawkes. Are three of them the same person? Is Charles the same person as Robert? If we assume that endurance of memories and knowledge and the extension of the same consciousness over time make a person self-identical, then we can also assume that Charles and Robert are the same persons as Guy Fawkes. However, Charles and Robert are simultaneously at different places and receive different experience. Thus, transitivity between them disappears, so they are not identical but similar to each other [36, pp. 4-11].

M. Schechtman notes that personal identity is considered as the duration of consciousness over time, but con-

sciousness cannot be analyzed in term of formal logic. Suppose, there is a patient with Alzheimer's disease, who often forgets the past, but then remembers again. If personal identity is analyzed as a relation between person-stages, such a patient would constantly lose and restore personal identity. And if the possession of personal identity is the ground of personhood, a patient with Alzheimer's disease can be regarded as a person at one time and as a non-person at another time, but that is impossible [42, p. 91]. M. Schechtman concludes that personal identity is not a relation between person-stages over time, but a characteristic of the united self [42, pp. 167-168].

In the narrative and normative approaches to the problem of personal identity, the philosophers develop the idea of the person constitution. A person is considered as an active being who realizes activity on practice. As a result, a person gets different experiences and has to unite them in a single entity to reduce inner conflict between motives. In such a way, the self emerges. While the self exists as the unity of experience, it stays numerically unchanged. Thus, personal identity is the characteristic of the self as a unity of experience when a person constitutes personhood in the process of life.

The philosophers explain the emergence and the duration of personal identity in different ways. For example, C. Rovane considers personal identity as the result of being in agency-regarding relations – interpersonal communication and interaction [41, p. 49]. For C. Korsgaard, personal identity emerges in the process of deliberation and the ascription of actions [32]. For H. Frankfurt, volition results in personal identity, and for M. Bratman, personal identity constitutes itself in the process of planning [40, 48].

## 4.2 The nature and conditions of personhood

What is meant to be a person? Is a person a substance? What is the difference between persons and non-persons? Is it possible to be a person without personal identity? R. Descartes and G. W. Leibnitz identified the origin of the self, and personhood with the substance. J. Locke introduces a new definition of a person, according to which, a person is characterized by self-knowledge and accountability of own actions. The existence of personhood extends over time back to the beginning of self-knowledge, which reflects in memory. This unsubstantial approach to the understanding of personhood and the self is developed in contemporary discussion.

J. Mackie interprets a person as a unity backwards-looking memory and forward-looking concern which emerges as the result of action ascription [49, p. 177]. C. Rovane defines a person as an agent with the first-person perspective – the ability to ascribe "I", understanding actions as own. Such agent achieves the rational unity, i.e. the unity of the self in mutual relations with other agents [41, pp. 209-210]. G. Strawson considers a person as the unity of three fields: the field of responsibility, the field of consciousness, and the field of concernment. The author emphasizes that a person is both a subject of

experience and a moral agent since a person takes responsibility for actions [50, pp. 24–25]. C. Korsgaard considers that a person's nature from the teleological viewpoint. A human being is a person if he or she achieves the purpose of personhood and realizes his or her functions as a person. The philosopher states that such function is the self-maintaining activity, i.e. maintaining the unity of self [32, p. 141]. Thus, the mentioned authors interpret the nature of personhood from the viewpoint of action appropriation, which results in the achievement of the unified self. When a human being acquires the unified self, he or she becomes a person, capable of self-knowledge. Personal identity emerges simultaneously with the unified self. And while a person keeps this continuity of the self over time, personal identity exists over time. Therefore, personal identity is a category for distinguishing persons from non-persons. A person is an agent with personal identity.

However, E. Olson notes, a person is “a functional animal, that is a person is just a stage in the life of a human being or, as he puts it, a human animal. Personhood is not a necessary condition for a human being to exist” [37, p. 109]. Firstly, a human being is an animal of a certain biological organization, and then, it becomes a person. The person-stage does not coincide in time with the human life: a fetus and a baby do not have either self-knowledge or unified self; therefore, they are not treated as persons; the person-stage may be suddenly interrupted when a human being is in a coma or the vegetative state. Thus, E. Olson concludes that the philosophers should consider personal identity as the biological continuity of life [37, p. 16].

### 4.3 The criteria of identity

The problem of the criteria of personal identity is the question of sufficient conditions, when a person is considered identical at one period of time to a person, existing at another time. The viewpoint that personal identity can reduce to a criterion or criteria is known as reductionism. The opposite point of view is non-reductionism. In publications and monographs [38, 39, 51–54], the authors distinguish two criteria: psychological and physical. The philosophers describe these two criteria in their variations.

According to B. Garrett's definition of the psychological criterion, personal identity over time “consists in the holding of the relation of psychological continuity between a person at different times” [53, p. 41]. The psychological criterion exists in the following variants: (1) as continuity of memories, (2) as continuity of consciousness, (3) as mental connectedness.

In Early Modern philosophy, personal identity is viewed as the continuity of memories. In analytic philosophy, P. Grice and S. Shoemaker consider identity as continuity of consciousness, adding other mental faculties to memories [34, 35]. They think that personal identity is a formal relation between two stages. H. Noonan and R. Nozick consider identity mental connectedness, but they admit that identity between person-stages is not a strict one-one relation, and it can have degrees of similarity [38, 39].

There are some critical remarks to the psychological criterion. Memory continuity interrupts when a person forgets some important episodes or suffers from amnesia. Memory is circular: if a person has memories, it means a person has already achieved the unified self, so memory cannot presuppose personal identity. A person may have false or quasi-memories, when he or she remembers was a witness of action but remembers it as his or her own. Consciousness interrupts when a person is asleep or in a coma. It is complicated to analyze consciousness as the criterion of identity if the later is regarded as a formal logic relation.

In the publications [36, 51–53], the physical criterion is defined as the spatial and temporal continuity of a person's body (or a body part). All mental activities and consciousness are considered as the properties of matter. The physical criterion exists in several variations. B. Williams identifies a person with a body, as the existence of a body is a pre-condition of the existence of consciousness [36]. R. Sperry, J. Shaffer and T. Nagel consider the unity of consciousness as the feature of brain activity [55–57]. So, while a brain continues to function, a person exists, even if the rest of the body does not survive. T. Nagel concludes: “I am identical with my brain” [57, p. 40]. E. Olson and P. Snowdon introduce animalism as a variant of the physical criterion [36, 44, 58]. According to P. Snowdon, a person is numerically identical to a human animal, so if this human animal keeps biological continuity, i.e. life, it can be a person [58, p. 172].

D. Parfit introduces non-reductionism [47, 51]. According to the philosopher, a criterion of personal identity has to presuppose personal identity in all situations without exceptions. However, both known criteria accept expectations, which D. Parfit shows in his version of the fission problem – a thought-experiment considering personal identity. Originally, this thought-experiment was introduced by S. Shoemaker. However, D. Parfit reconsiders it. Suppose, there is a person, named Brown, whose brain was divided into two halves so that each half of the brain remained the same in its functions as the whole brain. Then, these two parts were transplanted into two different bodies, and the original body was destroyed. D. Parfit asks: what will happen to Brown after the transplantation of the brain parts into new bodies. The philosopher suggests three possible solutions to the problem: (1) Brown will die; (2) one of two persons will be Brown; (3) Brown will continue to exist simultaneously as two persons (Brown<sub>1</sub> and Brown<sub>2</sub>) [47, p. 5].

The first option is quite questionable because one brain transplant is often successful, so double success can not lead to double failure when both parts of Brown's brain will stop functioning. If one part of the brain functions and the other does not, Brown will continue to live as Brown<sub>1</sub> or Brown<sub>2</sub>. Then, this person will be identical to Brown who existed before the operation. Thus, Brown will keep his identity over time. However, the problem arises as a result of double success if both parts of the brain function in two new bodies. In that case, Brown will be in two different places at once, and that is logically impossible. Moreover, Brown<sub>1</sub> and Brown<sub>2</sub> cannot maintain their identity

with Brown because their content of consciousness at the same time will be different [47, p. 5].

D. Parfit illustrates that both identity criteria are questionable. The psychological criterion bases on qualitative identity, so, when Brown<sub>1</sub> and Brown<sub>2</sub> appear, the identity of consciousness turns into similarity. The numerical identity of the brain as a body part is violated in this thought-experiment: two persons identical persons cannot exist at the same time. Thus, the philosopher concludes that the category of identity is not necessary for describing a person's continuity over time.

#### **4.4 Studying the problem of personal identity through the method of thought-experiment**

Analyzing the problem of identity as a fundamental relation, the philosophers often use the method of thought-experiment. The most known example concerning identity is the thought-experiment about the ship of Theseus. This method is also widely used in the problem of personal identity. B. Garrett admits that the philosophers show their interest in thought-experiments in personal identity because "consideration of ordinary cases will not help us to decide the issue" [53, p. 14].

J. Locke introduces the mentioned method in the personal identity problem. In Chapter 27 of "An Essay Concerning Human Understanding", J. Locke considers such examples as the example of the cut finger, body change between a prince and a cobbler, turned into an animal Heligabalus, and the Day-man and the Night-man in one body [26].

H. Noonan, B. Garrett, and J. Ballie consider methodological peculiarities of using thought-experiment in the problem of personal identity [38, 53, 54]. B. Garrett distinguishes the following scripts of the thought-experiments in the problem of personal identity: "Brain Transplant", "Scattered Existence", "Bionic Replacement", "Teletransportation", "Branch-line", "Accident", "Indeterminacy", and "Fission" [53, pp. 16-18].

In our opinion, the best-described thought-experiment is the fission problem. S. Shoemaker, D. Parfit, R. Nozick, H. Noonan, and others consider its versions. The typical script of the fission problem describes the situation when a person's brain is divided into two parts or when a person is reduplicated. Instead of one person, two identical people appear. As shown in the previous section, the fission problem disputes the existing criteria of personal identity and is the verification tool for any possible criteria of identity.

The use of thought-experiments has both advantages and disadvantages. B. Garrett thinks that "thought-experiments can be useful in understanding the structure of a concept and the relative importance of its different strands, provided that there is general agreement about the best description of the thought-experiment" [53, p. 14]. K. Wilkes criticizes this method for fantastic scripts violating all possible physical laws, and therefore, the results are doubtful. In her opinion, it is necessary to use this method only in conditions close to reality [59]. Nevertheless, the significant numbers of thought-experiments illustrate that this method is very productive, and it should be used not

only by philosophers but also by educators in teaching the problem of personal identity.

## **5 The steps of the introduction of the problem of personal identity in the course of philosophy**

The first step towards introducing the problem of personal identity is to place it in the structure of the philosophy course. There are three possible variants for that. Firstly, for the problem of personal identity has a rich philosophical background, it may be introduced in the context of Early Modern philosophy. It gives one more necessary links between Cartesian and Lockean philosophy because one of J. Locke's reasons to introduce the problem of personal identity was to show weaknesses of Cartesian philosophy. It also helps to form a better understanding of the British Early Modern philosophy and its development from Thomas Hobbes to David Hume since all of them contributed to that problem and considered the notions of personhood, consciousness, and knowledge.

Secondly, the problem of personal identity has connections with philosophical branches: metaphysics, theory of knowledge, and philosophy of mind. The analytic philosophers consider consciousness as a possible criterion of personal identity, and that gives connections to the mind-body problem. Personal identity also raises questions about the emergence of consciousness. The problems of continuity of memories, quasi-memories and the role of other mental faculties in the constitution of the self connect the concept of personal identity with philosophy of mind, and theory of knowledge. So, the problem of personal identity may be introduced at lectures and seminars concerning mentioned topics.

Thirdly, the problem of personal identity also outlines the difference between person and non-persons and concerns the notion of personhood, so it may be considered in philosophical anthropology.

For the problem of personal identity has a historical background and is connected with other philosophical branches, we decided to present it twice: (1) in the historical part in the lecture and the seminar devoted to Early Modern philosophy and (2) in the topic of philosophical anthropology. The first introduction of personal identity is in the topic "Early Modern Philosophy", which creates the necessary link between European (Cartesian) and British philosophy. The second introduction is in the theoretical part of the course, in the topic "Philosophical Anthropology" that is pre-last in the structure of the course. The problem of personal identity is presented in the context of nature and conditions of personhood, metaphysical status of personhood and the problem of definition of personhood. Placing this problem almost at the end of the course helps the students to summary students' knowledge from topic devoted to metaphysics, epistemology, and philosophy of mind.

The next step is to provide the students with the reference list and necessary learning material. As mentioned, the problem of personal identity is not typical for continental philosophy, so it is not represented in the Ukrainian



philosophic textbooks and companions. In spring 2021, the Department of Philosophy of Kryvyi Rih State Pedagogical University is going to publish the tutorial, where personal identity is analysed in the chapter “Philosophical Anthropology”. The list of references includes several papers in the academic journal “Actual Problems of Mind” (the publisher is Kryvyi Rih State Pedagogical University). The articles describe the historical development of the problem in Ancient Greek and Early Modern philosophy and present three approaches to the problem: metaphysical, normative and narrative [21–23].

Each seminar typically consists of two parts: discussion of the problem questions concerning theoretical aspects of a topic and the analysis of primary sources. So they constitute the essential part of the reference list. For the seminar, devoted to Early Modern philosophy, the reference list includes the following sources: (1) J. Locke’s “An Essay Concerning Human Understanding”, (2) J. Butler’s dissertation “Of Personal Identity”, (3) T. Reid’s “Essays on the Intellectual Powers of Man”. Making the reference list on personal identity, one will face difficulty because many primary sources have not been translated into Ukrainian. The students do not speak English on the advanced level either to read and analyze philosophical texts in the original. Thus, one of the main tasks is to translate key chapter and papers on personal identity. We have published the translation of J. Butler’s dissertation “Of Personal Identity” to help students to understand this problem better [60]. For we were the first in Ukraine in the translation of this material, this fact is considered as the novelty of our work. The further perspective is to publish the translation of T. Reid’s chapters, concerning personal identity.

The third step is about methods of introduction of the personal identity problem in seminars. The main method to introduce this problem is through thought-experiments. In the topic “Philosophy of Mind”, students get familiar with that methodology and usually analyze such puzzle-cases as “The Chinese room”, “Mary’s Room”, “The Brain in a Vat”. In the topic of philosophical anthropology, the students revise the learnt information and analyze personal identity through examples of thought-experiments, including B. Williams’s scenario of Charles’ and Robert’s personality shifts and S. Shoemaker’s brain transplant case with D. Parfit’s critical remarks. The other methods that help to memorize and structure material better are the following: the creation of mind-maps, making philosophical vocabulary, and essay writing. The supervision is conducted by using Moodle testing tools. In [61], there is a more detailed study of using e-learning platforms in teaching philosophy.

The further perspective of the study is the practical realization of the implementation, planned for the next academic year. After adding the problem of personal identity to the course of philosophy, we plan to introduce this problem into other courses, especially in ethics, cultural studies, philosophy of education, and methodology and organization of scientific research.

## 6 Conclusions

We have suggested introducing the problem of personal identity in the course of philosophy. The analysis of the problem of personal identity shows that its subject area consists of such aspects: the nature and conditions of personhood, the metaphysical status of personal identity, the criteria of identity, and the method of thought-experiment.

The problem of personal identity has a long history of development: it was formulated implicitly in Greek philosophy, and it has been developing explicitly since Early Modern philosophy. The metaphysical status of personal identity is the question, if identity is the relation between person-stages over time or if it is the characteristic of the unified self. The problem of personal identity illustrates that the understanding of the concept of person has been changing since Early Modern philosophy. Nowadays, a person is considered to be a functional entity. A human being is a person, when it is involved in the process of self-constitution, resulted in the emergence of personal identity. In analytic philosophy, there are two views on personal identity. According to the first, reductionist view, personal identity is grounded either on psychological or physical continuity. The non-reductionist view shows that no reliable criterion of identity. The method of thought-experiment emphasizes the weaknesses of the suggested criteria. It is used as the method of verification. Although the philosophers often criticize it for unrealistic scenarios, the method of thought-experiment remains productive in philosophy, with the help of which the teacher can present the problem.

The problem of personal identity has connections with topics of the course concerning the history of philosophy, metaphysics, theory of knowledge, philosophy of mind, and philosophical anthropology. Thus, there are several variants where to place the problem of personal identity into the course of philosophy. The paper proposes to introduce it twice: in the topic “Early Modern Philosophy”, and in the topic “Philosophical Anthropology”. The first introduction gives the outline of the historical background of the problem and helps to connect Cartesian philosophy and British empiricism. The further analysis of personal identity in the topic “Philosophical Anthropology”, which is the per-last in the course structure, considers the problem of personal identity as the essential feature of personhood. The second turn to personal identity gives the students the possibility to refresh their knowledge of metaphysics, philosophy of mind, theory of knowledge and understand the material better.

The problem of personal identity is not highlighted well in Ukrainian philosophical discourse, so its implementation faces the lack of learning material in the Ukrainian language. That’s why our primary task is translating primary sources and writing tutorials for the students.

The main method of introduction of personal identity in the classroom is the method of thought-experiment. There are some possible scenarios of thought-experiments on personal identity: “Brain Transplant”, “Scattered Existence”, “Bionic Replacement”, “Teletransportation”,

“Branch-line”, “Accident”, “Indeterminacy”, and “Fission”. Such variety has great educational potential as the teachers can use these thought-experiments in different learning situations. We suggest analyzing William’s and Shoemaker’s puzzle-cases at the seminar. They are examples of the so-called fission scenario. The other methods used in teaching personal identity in the classroom are the following: the mind-map creation, making philosophical vocabulary, essay writing.

After the introduction in the course of philosophy, the problem of personal identity may be introduced in the structure of ethics, cultural studies (for the students of the bachelor’s programme), philosophy of education (for the students of master’s programme), and in methodology and organization of scientific research (for PhD students).

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## Development of the health-preserving competence of a physical education teacher based on the knowledge about influenza and bronchitis prevention

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**Abstract.** The article presents the methodology and methods of improving the health-preserving competence of a Physical Education teacher under conditions of postgraduate education based on the knowledge of prevention of acute bronchitis, COVID-19 influenza and acute respiratory diseases. The “Disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher” is used, which includes such developed “integrated disciplines” as Pathopedagogy, Propaedeutics of Health and Health Therapy. The matrix is aimed at professionalisation, methodologisation, technologisation, anthropologisation, axiologisation of the health-preserving competence of a teacher. The “Methodology of developing health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases” is used. The methodology is based on the competence approach, the above-mentioned matrix, problem-based and flipped learning, andragogy, game, maieutic and dialogic methods, the use of pedagogical tasks, the Hellenistic concept of “self-care” and others. In this methodology, knowledge, values and practical health-preserving strategies are hierarchised with the singling out of three levels – A, B and C. Level A is obligatory, and levels B and C are given less attention. An experimental study was conducted the result of which determined the effectiveness of this method. These methodology and method are humanistic and ecocentric and consistent with the ideas and sustainable development goals.

### 1 Introduction

The health-preserving competence of a Physical Education teacher [1] is a professional and personal as well as epistemological and value professional “toolkit”, which is aimed primarily at the optimal solution by a teacher of specific problems, tasks and situations connected with both physical activity and children’s health. That is, in the professional activity of a Physical Education teacher, the complexity and multidimensionality of human nature are revealed, first of all, in the format of working with practically significant phenomena. In the professional “reality” of an educator, the above-mentioned phenomena are revealed as a system of relevant and significant, practical and technological issues. For the optimal solution of such issues, a teacher requires intellectual skills in making specific (in the sense of concretised and adapted to a problem), practical and life creation-oriented optimal decisions, as well as the presence of special knowledge and practical skills to implement strategies and tactics related to certain problems.

Nowadays the existing tradition of decision-making in complex pedagogical situations involving risks to health and life is based primarily on the prescription “format” of knowledge presented mainly in the form of certain recommendations. The issue of the “prescription” nature of the application concerns the educational range of problems of health-preserving technologies, strategies and practices. In this aspect, it is the range of problems of their development, selection, specifics of use and strategic issues of the necessity and expediency of implementation that are relevant. The above-mentioned “prescription” tradition is certainly optimal, but at the same time insufficient for many reasons, namely: not full disclosure of human phenomenology under conditions of physical exercise and pathology, by the fact that the recommendations reflect not only the leading ideas of scientific schools but also cultural traditions and stereotypes, which may not be sufficiently objective and relevant to reality; by unformed and undisclosed appreciative and semantic “reality” and a motivational factor as those that determine personal and activity prerequisites of practices and technologies. That is, such recommendations are not always sufficiently objective, value and activity-oriented, scientific, evidential and,

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in general, inconsistent with the competence paradigm. In this aspect of the range of problems, the dominance of general recommendations for preserving health has great importance as well as the predominance of healthy lifestyle traditions, in which the phenomenology of a human both under normal conditions and, first of all, under conditions of pathology are not taken into account in full.

Based on the ideas of evidential nature and guided by the intentions of scientific nature, it can be noted that nowadays the existing ideology of child-centeredness [2, 3] and humanism [4] in education determine the need to form the teacher's ability to make optimal health-oriented decisions. Accordingly, such decisions must be "intellectualised", "anthropologised" [5, 6] (that is, formed on the basis of knowledge of human nature), axiologised and evidential from the standpoint of both science and practice. Such anthropologised decisions must be based primarily on the transfer of not only special medical and hygienic, valeological and anthropological knowledge [5, 6], but also be realised by way of the reception of appropriate algorithms of thinking, cognitive schemes, values, some components of practices and technologies, professional ethics and stereotypes of behaviour.

It should be noted that in our time the potential of anthropological knowledge, which is necessary for the development and use in educational technologies and health-preserving practices, including the ideas of pathology, is not used in full. That is, there is a methodologically and practically significant discrepancy between the existing significant level of anthropobiological and, in general, anthropological knowledge and their insufficient use in pedagogy and education. Targeted and problem-oriented selection and, accordingly, practice-oriented actualisation and representation of that knowledge of a human (child) which are necessary for the analysis and resolving typical problems and situations, in which the nature of a human is reflected, are important for effective preservation of health under conditions of an educational process. Accordingly, the technological and value-orientation as well as specification (in the sense of concretisation) of knowledge (both general and specialist) about a human (child) both under normal conditions and under conditions of pathology are also important.

Therefore, phenomenology- and problem-oriented understanding of the professional reality of a Physical Education teacher, we emphasise the need to update and disclose specific practically significant phenomena, with which he/she works in the process of improving the level of professional skills. Such a life-creative and practice-oriented approach is also in line with the spirit and meanings of the competency and innovative paradigms. Accordingly, we turn to the need for practice-oriented disclosure of educationally and vitally important range of problems of acute bronchitis prevention [7, 8]. This pathology (in the sense of a disease) – acute bronchitis might be the result of "ordinary" influenza, Covid-19 [9], acute respiratory infection, hypothermia and stress situation. Acute bronchitis is a phenomenon that occurs quite often. At the same time, acute bronchitis [10] as a specific educational and pedagogical problem is not given enough atten-

tion. Therefore, we actualise, as an educationally significant problem, the preservation of health of students under condition of an educational process based on the coverage of the phenomenology of respiration and respiratory system in relation to the transfer of knowledge of prevention of acute bronchitis, as well as by studying the possibility of correcting the consequences of this pathology with the help of physical culture means. The above-mentioned range of problems is considered by us in innovative and systematic aspects. Technologically value understanding of the phenomenon of acute bronchitis is significant in terms of the development of health-preserving thinking of a Physical Education teacher and the formation of his/her professional aims, attitudes, intentions and values.

Now a central system-organizing and key aspect, which highlights the relevance and significance of this problem, is the Covid-19 pandemic [11–15]. A special life-saving aspect, which reveals the vital importance of this range of problems, is the issues of prevention of complications of acute bronchitis [10] under conditions of an educational process, including the physical activity of students during Physical Education lessons. Such complications include life-threatening pneumonia as well as chronic bronchitis and bronchial asthma [7, 8]. In the context of actualisation of this problem, it is important to realise that a Physical Education teacher does not really work with an "ideal" child who is "always" healthy. He/she runs classes with children who have certain peculiarities and pathologies which correspond to human nature. Therefore, the above-mentioned peculiarities of those "real" children and systematic risks, which are "dictated" by human nature [5], require a health-preserving interpretation of practical problems by a teacher. The competence-oriented aspect is that these problems have to be optimally solved by an educator in situ (lat. on the spot) and in a temporal "mode" *hic et nunc* (lat. now and at present). Accordingly, a teacher needs to be able to understand and interpret in a health-oriented manner the risks as well as to effectively manage them by way of active and purposeful implementation of health-preserving technologies, strategies and tactics. In the latest humanistic and nature-friendly, in essence, socio-cultural traditions, an appreciatively significant is the fact that now the diversity and multidimensionality of human nature are presented as an individual specificity and peculiarity. In our time of Eurocentric and humanistic transformations of the Ukrainian educational landscape, such visions and understanding of human nature are reflected in the introduction of inclusive culture and inclusive education [16].

In the scientific and pedagogical literature, the range of problems of development of health-preserving competence of a Physical Education teacher under conditions of postgraduate education based on comprehension of human nature through the methodological, technological and appreciative reflection of the knowledge of prevention of acute bronchitis [10], influenza, Covid-19 and acute respiratory diseases is insufficiently disclosed. Given the importance of the systemic and global impact of the Covid-19 pandemic, seasonal "waves" of "ordinary" influenza and acute respiratory diseases on children's health under

conditions of an educational process, we define this range of problems as relevant.

*The aim* of this study is the innovation-oriented improvement of the methodology, methods and practices for the development of health-preserving competence of a Physical Education teacher under conditions of postgraduate education based on the transfer of knowledge of the prevention of acute bronchitis, influenza, Covid-19 and acute respiratory diseases.

## 2 Methods of the research

The study used the following methods and approaches: the analysis of the scientific literature, innovative, competence [17, 18], systemic, problem, morphological and functional, phenomenological, axiological [19], philosophical, anthropological [5, 6, 19–21], ontological, epistemological, narrative, existential [4], temporal, synergetic [22, 23], pathopedagogical [1, 10], etiological (in health pedagogy) [1, 10], propaedeutic (in health pedagogy), narrative, existential, psychological, preventive [1, 10, 24], transdisciplinary [25, 26], hermeneutic [17] and inclusive [16].

*Humanitarian, pedagogical and anthropological concepts and methods.* The study used the following concepts: knowledge transfer [27], diffusion of innovations [28], humanisation of education [1–4], anthropologisation [4, 5, 19–21], “health-welfare” by H. Sigerist [29], homeostasis [30] and “methodological technologies” [31]. The methodological potential of maieutic, existential [4] and dialogic pedagogy was used. One of the central in this study was the use of systems of pedagogical tasks [32, 33].

The principles and approaches of continuing education [34], andragogy [35] and acmeology, as well as problem-based learning [36], game methods [37], flipped learning [38], maieutic and dialogic methodologies, brainstorming technology [39], examination and analysis of the pedagogical best practice of teachers were used [40].

*Paideia ideas.* The ideas of the ancient Greek spiritual and educational system of Paideia (ancient Greek *παιδεία*) were used [41, 42] as well as Hellenistic concepts of human nature (ancient Greek *φύσις του ανθρώπου*) [41], observance of measure (ancient Greek *συμμετρον μετριον*) [41], harmony (ancient Greek *κραιζ*), healthy lifestyle, self knowledge (ancient Greek *γνώση αυτων*) (gnothi sautou) (interpreted by M. Foucault) [43, 44] and care of oneself (ancient Greek *πιμλια αυτων*) (epimelēsthai sautou) (interpreted by M. Foucault) [43–45].

*Digital technologies.* Digital technologies were actively used – the work with Internet resources, in particular: augmented reality [46], virtual reality [47] and cloud technologies [48].

*Our own methodological and procedural concepts.* The system-organizing aspect of the research methodology is the “The disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher” that was developed by us [1] and “Methodology of developing health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respira-

tory diseases”. Based on the application of the idea of “integrated disciplines” (according to A. Subetto) [49], we have formed and applied such integrated disciplines as “Pathopedagogy” [1], “Propaedeutics of Health” [1] and “Health therapy” [1]. These “integrated disciplines” are considered as components and levels of the presented above disciplinary and methodological matrix. We used the dynamic health-preserving monitoring and health-preserving protocol developed by us. The ideas of hierarchisation of health-preserving knowledge were used and health-preserving communication was actualised and applied.

*Methods of performance control.* The methodology is represented by the system consisting of 8 tasks and 10 questions. Its purpose is to control the knowledge, intellectual skills and readiness of a Physical Education teacher for health-preserving activity based on the knowledge of the prevention of acute bronchitis, influenza and acute respiratory diseases. This methodology is part of the “Methodology of developing health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases”. The tasks and questions are presented in a test form. A Physical Education teacher has to choose 1 correct answer out of 4. Let us present a list of tasks and questions.

*Tasks:*

1. “Prevention of complications of acute rhinitis”.
2. “Prevention of complications of bronchitis”.
3. “Prevention of sudden cardiac death after influenza”.
4. “Prevention of heart disorders due to the influence on respiration”.
5. “Prevention of movement structure disorders (running) due to the influence on respiration”.
6. “The influence of breath holding arrest on the heart and respiratory system”.
7. “The influence of nasal breathing during strenuous physical exercise on the cardiovascular and respiratory systems”.
8. “The influence of hypothermia on the respiratory system and heart”.

*Questions:*

1. What are the main disorders (in the sense of a disease) in the respiratory system that can occur due to influenza and how this process can affect motor activity?
2. What are the benefits of rinsing the nose with water and what are its possible consequences?
3. Is it advisable to purposefully and constantly train the respiratory system using mainly special breathing exercises?

4. Cough and dyspnea indicate the possible disorders in the respiratory system and one more system. Which one?
5. Is it necessary to purposefully actualise the maximum involvement of all muscles that ensure the respiratory process during the motor activity?
6. At the expense of what structures and mechanisms are the inhalation and exhalations realized?
7. What is the health hazard of tonsillitis and how to take it into account when organizing physical activity?
8. How such a complication of bronchitis as pneumonia is dangerous for a human?
9. In which structures in bronchitis are the main pathological changes and how you can influence this process by means of physical culture?
10. In which structures are the main pathological changes in pneumonia and how you can influence this process by means of physical culture?

The “Results” section presents 5 tasks that were used for both performance monitoring and training (in a slightly modified and detailed format).

*Methods of mathematical statistics.* In order to compare the results of the study before and after the implementation of “The methodology of the development of health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases”, in the experimental group, we used a Student’s t-test [50]. Given the need to confirm the statistical significance of the difference between the mean values of the two dependent samples, the following algorithm of the Student’s t-test was used:

1. We check the normality of the data distribution in the dependent samples, which are compared.

We calculate the empirical values of the skewness coefficient (skewness) (*Skew*) (1) and excess kurtosis (*Kurt*) (2) for the dependent samples. The obtained values are compared with the corresponding critical values of skewness (*Skew<sub>crit</sub>*) (3) and excess kurtosis (*Kurt<sub>crit</sub>*) (4).

$$Skew = \frac{\sum_{i=1}^n z_i^3}{n}, \quad (1)$$

where:

$n$  is a sample size;

$z_i$  ( $i = 1...n$ ) is calculated by the following formula

$$z_i = \frac{x_i - \bar{X}}{\sigma};$$

$\sigma$  – the standard deviation is calculated by the following formula

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{X})^2}{n - 1}};$$

$\bar{X}$  – expected value (arithmetic mean).

$$Kurt = \frac{\sum_{i=1}^n z_i^4}{n} - 3. \quad (2)$$

$$Skew_{crit} = 3 \cdot \sqrt{\frac{6 \cdot (n - 1)}{(n + 1) \cdot (n + 3)}}. \quad (3)$$

$$Kurt_{crit} = 5 \cdot \sqrt{\frac{24 \cdot n \cdot (n - 2) \cdot (n - 3)}{(n + 1)^2 \cdot (n + 3) \cdot (n + 5)}}. \quad (4)$$

If the empirical values of the skewness and excess kurtosis respectively are less than the critical values of the skewness and excess kurtosis, a decision is made on the normality of the data distribution.

2. We check the availability of a direct correlation between the dependent samples. We use Pearson correlation coefficient  $r_{x_1, x_2}$ . For its application it is necessary for the data to be distributed in the normal way.

We formulate statistical hypotheses:

$H_0$ :  $r_{x_1, x_2} = 0$ , no correlation between data;

$H_1$ :  $r_{x_1, x_2} \gg 0$ ,  $p < 0.05$ ; there is a direct correlation between the data, which is significant at the level of 0.05.

Pearson correlation coefficient  $r_{x_1, x_2}$  is calculated by formula (5):

$$r_{x_1, x_2} = \frac{n \sum_{i=1}^n x_{1i} x_{2i} - \sum_{i=1}^n x_{1i} \cdot \sum_{i=1}^n x_{2i}}{\sqrt{\left( n \sum_{i=1}^n x_{1i}^2 - \left( \sum_{i=1}^n x_{1i} \right)^2 \right) \cdot \left( n \sum_{i=1}^n x_{2i}^2 - \left( \sum_{i=1}^n x_{2i} \right)^2 \right)}}, \quad (5)$$

where  $n$  is a sample size.

The calculated coefficient  $r_{x_1, x_2}$  is compared with the critical value  $r_{crit}$  (according to the table of critical values of Pearson correlation coefficient). If  $r_{x_1, x_2} < r_{crit}$ , then we accept hypothesis  $H_0$  about the absence of correlation, and if  $r_{x_1, x_2} \geq r_{crit}$ , then we accept hypothesis  $H_1$  that there is a direct correlation between the data, which is significant at the level of  $p < 0.05$ .

3. We calculate Student’s t-test ( $t$ ) (6) for dependent samples  $X_1$  and  $X_2$ . We compare the calculated empirical value of Student’s t-test with the critical tabular value of Student’s t-test. We come to the conclusion that hypothesis  $H_0$  about the absence of differences is confirmed or rejected.

Application of Student's t-test is carried out step-by-step:

a) We formulate statistical hypotheses:

$H_0$ : the differences between  $X_1$  and  $X_2$  are random and insignificant.

$H_1$ : the differences between  $X_1$  and  $X_2$  are trustworthy, significant.

b) We calculate the differences  $d_i$  ( $i = 1 \dots n$ ) between pairs of sample values  $X_1$  and  $X_2$ .

c) We calculate the empirical value of Student's t-test ( $t$ ) by formula (6):

$$t = \frac{|\bar{X}_d|}{\sigma_d / \sqrt{n}}, \quad (6)$$

where  $\bar{X}_d$  is arithmetic mean of differences of pairs of values of  $d_i$  ( $i = 1 \dots n$ );

$\sigma_d$  is standard deviation of differences of pairs of values of  $d_i$  ( $i = 1 \dots n$ );

$n$  is a sample size;

d) We find the critical value of  $t_{crit}$  in the table of critical values of Student's t-test, taking into account the number of degrees of freedom  $df = n - 1$ . If  $t > t_{crit}$ , we accept hypothesis  $H_1$ . If  $t \leq t_{crit}$ , we accept hypothesis  $H_0$ .

### 3 Results and discussion

The process of improving the health-preserving competence of a Physical Education teacher [1] under conditions of postgraduate education is realised through the use of the transfer of knowledge about the prevention of bronchitis, influenza and acute respiratory diseases [7, 10]. Practice-oriented knowledge of the morphophysiology of the respiratory system under normal conditions and in pathology as well as understanding of respiration as an anthropocultural phenomenon are also used as system-forming and "background" ones. Nowadays the knowledge about the prevention of COVID-19 is also used [11]. Besides, both the levels of methodology and methods as well as technologies and practices are actualised. At the level of methodology, the "Disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher" [1] that was developed by us is used as a competence-oriented, essential and system-organising methodological technologized strategy.

Methods, technologies and practices are implemented through the use of a system of interdependent and practice-oriented tasks [32, 33] and issues. The examination and analysis of situations, problems, educational and anthropological phenomena are performed both under normal conditions and in borderline states as well as in case of pathology.

Let us consider the methodological aspect presented by "The disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher"

[31]. This matrix is implemented on the basis of specific competence and innovation-oriented "methodological technology". The term "disciplinary and methodological matrix" was used by T. Kuhn [51, 52] who used it to denote the system of scientific ideas, schemes, intentions and attitudes dominant in a certain epoch. In this pedagogical system, a disciplinary and methodological matrix has a special, concretised, applied and specific purpose. The disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher is developed on the basis of the use of systemic, special-purpose and competence approaches [17, 18]. In this aspect, the competency approach is a key one, within the framework of which the requests and needs for the design or improvement of a particular competence are the methodological intention and practical orientation that determine the system and direction of selection and configuration of certain disciplines, ideas, concepts, values that are used to perfect a specialist. Thus, the disciplinary and methodological matrix is formed primarily on the basis of requests aimed at solving specific educational and life problems as well as by technological and axiological comprehension of the phenomenon of human health and nature both under normal conditions and under the condition of crisis situations and pathology.

Within the framework of this matrix, the concepts, ideas, values, practices and technologies, which are aimed at solving a certain system of problems and are necessary for the improvement of the health discipline, are integrated. This approach is a prerequisite for the formation of a range of technological capabilities. It also contributes to the unlocking of epistemological, personal and axiological potential of a person, which is a necessary "competence condition" for optimal professional functioning of a Physical Education teacher. A similar methodological approach to training specialists exists in sociology and medicine. In particular, in medicine there has been a gradual transition from the study of disciplines that reveal human phenomenology in general and in normative formats to the coverage of human nature under conditions of pathology and by presenting specific anthropological phenomena, followed by a transition to practices and technologies. From a methodological standpoint, this matrix is formed as a "movement" along the "epistemological axes": "fundamentalisation – technologisation", "from general to specific"; "from problems to phenomena"; "from knowledge, schemes and ideas to the cognition of phenomena in reality"; "from knowledge to practice-oriented knowledge and practices and technologies"; "from the general values of human to technological values that determine activity"; "from the idea to learn and know to – to navigate, act and be able to". The disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher (see figure 1) [1] is a "dynamic epistemological system", in which six qualitatively different levels are singled out. The learning process is organised on the basis of interaction and transfer of knowledge, values and meanings among different levels. Therefore, this system is not only linearly consistent (although this aspect is present in it) but also contains feedback. The specified



multilevel structure determines the possibilities for forming in an educator the capacity for conceptualisation based on the practice-oriented actualisation of the whole spectrum of knowledge about a human. Let us consider the six-level structure of this matrix:

Level I – General ideas of a human

Level II – Pathopedagogy

Level III – Propaedeutics of health

Level IV – Health therapy

Level V – Health-preserving practices

Level VI – Health-preserving technologies

This disciplinary and methodological matrix uses an epistemological idea of health-oriented understanding and disclosure of human nature and his/her health through systemic, transdisciplinary [25], problem, selective and at the same time special-purpose, purposeful and practice-oriented cognition. This matrix is developed on the basis of competence paradigm [17, 18], ideas of praxeology, practical interpretations of T. Kuhn's ideas [51, 52], receptions of the concept of "Methodological technology" by B. Sazonov and H. Shchedrovyytskyi (work "Methodology as technology") [31], application of O. Subetto's [49] concept of "integrated disciplines" that are developed on the basis of educational requests up to the formation of a certain competence.

We represent this disciplinary and methodological matrix as a methodological technology for the development of a health-preserving competence of a Physical Education teacher. In the content and semantic as well as the axiological and motivational framework of this matrix we will present some fragments of the content part as an example of an application of this methodological technology. Accordingly, we will resolve some issues of the phenomenology of the respiratory system under normal conditions and conditions of pathology using the transfer of knowledge about the prevention of bronchitis [7, 10], influenza and acute respiratory diseases.

*Level I – General ideas of a human* is a system of disciplines, scientific areas of research, ideas, technologies and practices that form mainly theoretical and partly technological and, at the same time, professionally oriented "general idea" about a human as a multidimensional phenomenon. This is realised by studying relevant and generalised issues of health preservation based on the knowledge of such disciplines as anatomy, histology, physiology, sports physiology, ecology, anthropology (physical, psychological, environmental, social, sports, philosophical), methodology, pedagogy, philosophy, psychology and others.

At the above-mentioned level, attention is selectively focused on the technologically significant knowledge [10] of the respiratory system under normal conditions. As an example of the content component of this pedagogical system we will briefly present some system-organising

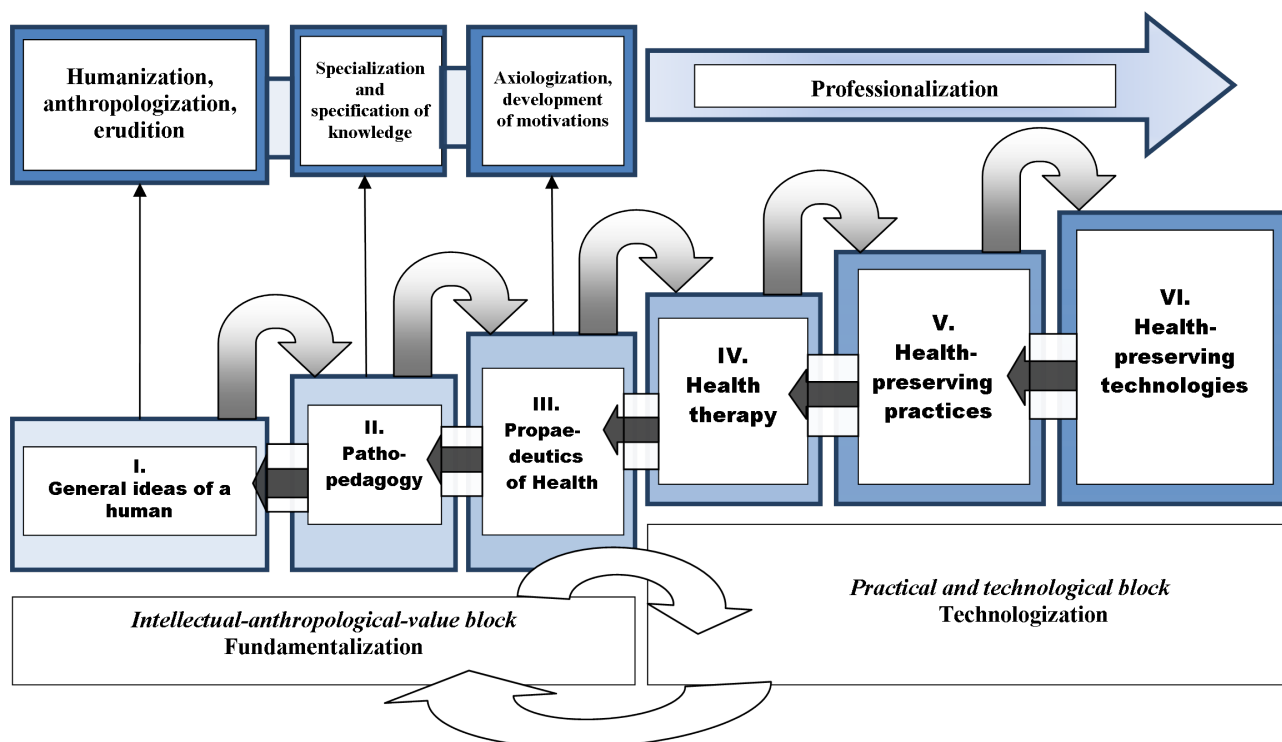
knowledge. Of fundamental importance for a teacher's understanding of the risks of the formation of respiratory disorders is not the details of the structure, but the fact that the conductive and functional parts are singled out in the respiratory system. The conductive part includes the nasal cavity, pharynx, larynx, bronchial trachea and bronchioles. The conductive part as a whole has the general plan of the structure presented by the tubular formations covered with a stratified squamous or pseudostratified (a variant of a single-layer) ciliated epithelium with the inclusion of goblet cells producing mucus. The above-mentioned formation [7, 10] structurally determines the peculiarities of "smooth" and "slow" (in comparison with pneumonia) course of inflammation and the tendency to transition of acute bronchitis (that is formed relatively quickly – from several hours to 3-6 months) to a chronic form (lasting for a long time – month and years). A typical disorder in this case is bronchitis.

The functional part (in which the process of respiration is realised) is represented by acini (literal translation of "bunches of grapes"), which are represented by a single-layer epithelium that can be easily and quickly damaged. Gas exchange takes place in acini. Acini, which consist of alveoli, can be damaged quickly and therefore inflammation or their other damage proceeds relatively quickly, with a pronounced acute phase and is not transformed into a chronic (long or continuously proceeding) form. This disorder is called pneumonia.

When revealing the phenomenology of the respiratory system at level (I) in the process of improving the level of professional skills, it is practically important issues, phenomena, situations and tasks that are selectively actualised. It is through the consideration of these issues, situations and tasks that the repetition and restoration of general ideas about the respiratory system take place. Accordingly, the orientation and specification (concretisation) of knowledge about the respiratory system is carried out for the purpose of applying them in the health-preserving practices and technologies.

*Level II – Pathopedagogy* [1] is formed by the disciplines that aim to reveal the phenomenology of a human under conditions of stress, tension, pathology and extreme conditions. This is realised by studying such disciplines as pathological physiology, pathological anatomy, clinical physiology, stressology, defectology, ecology and inclusion. The above-mentioned areas are integrated by us in the format of the "integrated discipline" [49] Pathopedagogy.

At this level, we actualise knowledge about general and particular pathological processes [1, 24]. This knowledge is basic and conceptualising, and, accordingly, forms the basis of the particular, for the purpose of understanding of pr health-preserving thinking of a teacher. Relevant and essential in this aspect is the doctrine of the causes of the disorders – the etiology and mechanisms of disease development – pathogenesis. The basis of prevention is based on knowledge of the causes. And the prevention of complications of bronchitis is formed on the basis of general ideas about the mechanisms of disease development – pathogenesis. Therefore, it is consciously and intellectu-



**Figure 1.** Scheme of the structure of the disciplinary and methodological matrix of health-preserving competence of a physical education teacher. The arrows show the transfer of knowledge

ally, and not only on the basis of prescription that prevention is formed using the knowledge of the causes and some ideas about the pathogenesis.

In particular, for the purpose of understanding of prevention by a teacher, we briefly mention the phenomenon of inflammation that is divided into three stages, each of which lasts 7 days. In reality, we mainly observe and realise the problem for health when the second stage of inflammation is manifested – exudation (accumulation of the fluid). For example, for diagnostics, it is important to understand that this stage of exudation (accumulation of the fluid) is manifested (i.e. we can observe it and ask about it) in the form of cough and shortness of breath. When the exudative stage of inflammation approaches its end, it is manifested, first of all, in the appearance of sputum when coughing. A relevant conclusion for practice is the strategy of complete exclusion of purposeful training at the exudation stage. If this is not done, then the inflammation will spread through the respiratory system, increasing the risk of complications.

In the process of improving the level of professional skills, the etiology (the science of the causes of pathologies) of acute bronchitis is examined in detail. Among the main causes of acute bronchitis, we can indicate infection (influenza, COVID-19, acute respiratory diseases and ornithosis that is spread by birds); temperature (mainly hypothermia); high humidity of the air and the presence in the inhaled air of irritants, toxic substances, allergens, microbes and dust [7, 9, 10].

Particular attention is paid to the issues of prevention of bronchitis complications, especially pneumonia as a

central and essential problem, which is a systemic risk to the life of a child. In the context of axiological understanding of this range of problems, we point to the need for teachers to form, first of all, life-saving attitudes, intentions, values and meanings of prevention of acute bronchitis. This is especially important under conditions of the COVID-19 [9, 11] pandemic because this form of influenza is developing swiftly, “in a galloping manner”, “avalanche-like” and leads to serious complications, and for some time, maybe asymptomatic (i.e. without manifestations) and then “appear” in all its manifestations. This necessitates a teacher’s attention to the swift and latent (hidden) course of COVID-19 as its dangerous peculiarities.

The above-mentioned level contributes to the formation of the health-preserving thinking and appropriate intellectual strategies and tactics of a Physical Education teacher. A relevant aspect is the actualisation of responsibility for the life and health of students as a system-organising professional value. When considering this range of problems, it is the life-saving aspect that becomes the main focus. An important area is also the prevention of bronchial asthma [8] and chronic bronchitis as probable complications of acute bronchitis. The above-mentioned prevention and correction can to some extent be implemented by means of physical culture.

*Level III – Propaedeutics of health* (anthropologically and axiologically-oriented propaedeutic level) [1], aimed at forming general ideas about really existing problems of a human and his/her health both under normal conditions and under conditions of possible pathology, including the

knowledge of potential risks. Within the content and semantic framework of this level, the range of problems of professional ethics, values, personal qualities, standards and stereotypes of behaviour, intentions and professional attitudes is actualised, that is, those components that form the personal and existential as well as partially active and discursive components of health-preserving competence of a Physical Education teacher.

The problems of prevention are considered on the basis of the analysis and integration of the knowledge and values covered when considering levels I and II. Practice-oriented approaches to primary before-doctor diagnostics of the acute disorders of the respiratory system are formed. First of all, for example, attention is focused on the symptom of cough as an essential one for further health-preserving strategies.

In the context of the implementation of risk management strategies, the ways of implementing *health-preserving dynamic monitoring*, singling out of risk groups and targeted working with them are presented. Issues of effective *health-preserving communication* under conditions of an educational process are actualised. At this level, a teacher learns: to communicate with children on the topic of prevention of acute bronchitis, to psychologically and organisationally influence them, to form and use preventive and corrective strategies, to observe and diagnose in general (before-doctor diagnostics) possible acute inflammatory pathology of the respiratory system.

*Level IV – Health therapy* (technologically and axiologically-oriented level of health therapy) [1] is aimed at practically and axiologically-oriented coverage of the phenomenology of a human and his/her health, risks and conditions of formation of certain pathologies and peculiarities of crisis, pedagogical and life situations that are dangerous to the life and health of a child. Statistically significant pathologies [7–11] and conditions that precede them are also studied in a practice-oriented way as well as general ideas about before-doctor diagnostics, strategies of providing help, prevention and correction with the possible use of means of physical culture are revealed.

At this level, in general, the following is analysed: peculiarities and differences of bronchitis caused by influenza, COVID-19 [9] and acute respiratory diseases; individual, sexual and developmental peculiarities of children's morphophysiology in the context of bronchitis prevention; strategies for the use of physical culture means to prevent such complications of bronchitis as bronchial asthma [8] and chronic bronchitis. Primary and special attention is paid to the focus on individual preventive and corrective work with students based on the study of peculiarities of their lives and problems. To do this, we use the diagnostic technology developed by us that is represented by a *health-preserving protocol*. This protocol reflects in dynamics (in time) both the positive state of a student's respiratory system, his/her health in general and some possible problems and pathologies considered in the context of and in relation to motor activity. That is, at this level, the knowledge is further specified (concretised), provided practical orientation, transformed into strategies and algorithms of action and is revealed as an intellectual tool

for working with a particular person and specific problems and phenomena.

*Level V – Health-preserving practices*, including “bodily and motor” as well as “motor and intellectual” in their essence anthropopractices “self-practice” or “self-technology” (according to M. Foucault) [44] that are implemented in an educational process and during extracurricular activities. Practices of diagnostics, correction and prevention of disorders of the respiratory system are also actualised. The conditions, approaches and ways of forming a safe and healthy educational environment are determined. That is, the level of practices determines the real educational process and, accordingly, in its essence, it is what forms a health-preserving environment. The ways of using, combining and integrating various educational technologies, methodologies, techniques, strategies and recommendations within the framework of educational practice and environment are analysed.

*Level VI – Health-preserving technologies* that also contains methodologies, recommendations, strategies, tactics and teaching techniques of preserving and forming health including diagnostic, corrective, developmental and preventive ones. At this level, a teacher acquires and tests certain health-preserving technologies and methodologies and correlates them with motor activity. Within the framework of using the potential of this level, it is important to have special teacher training, which is necessary for the proper implementation of certain health technologies and their selection as well as not using what is not evidential and may create certain health risks.

Health-preserving technologies are analysed from the standpoint of their suitability and possible adaptation and modification for use in acute bronchitis. Desemanticisation and demythologisation of typical myths and fixed notions of the preservation of respiratory health are carried out. For example, the “traditional” recommendations in acute bronchitis and other pathologies of the respiratory system such as to actively use physical exercise, including breathing exercises as well as conditioning to the cold temperatures are critically analysed.

Representing the technological potential of the level of health-preserving technologies, for example, we recommend relatively short and slow walking (300–800 m) in influenza and bronchitis, depending on the general condition. This recommendation is relevant only under favourable environmental and temperature conditions and in relatively good health. It is recommended to use “locally” and individually the elements of the respiratory gymnastics according to the system of K. Buteiko [53] for the purpose of “calming” breathing and “removing” bronchospasm.

Let us consider the key aspects of “The methodology of forming health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases” [7, 9, 10]. The methodology is formed and implemented on the basis of the competence approach and “The disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher” [1]. The methodology is developed on the basis of use

of pedagogical tasks [32, 33], analysis and examination of issues, situations and anthropological phenomena (in particular, anatomy, physiology and pathology of the respiratory system and their cultural and professional interpretations and representations) [53] and representation of practical recommendations of strategies and tactics. In addition, the following are applied: the principles and ideas of acmeology [34, 35], problem-based learning, game methods, flipped learning, maieutic and dialogic methodologies, brainstorming technology, examination and analysis of the pedagogical best practice of teachers [40], illustrations and video fragments in which this range of problems is revealed; dynamic health-preserving observation is taught and the ways of using the health-preserving protocol are covered. Considerable attention is paid to the analysis and examination of certain motor modes, physical exercise, sporting and health-improving technologies, practical recommendations in the context of prevention of bronchitis, influenza and acute respiratory diseases [7, 9, 10] as well as the correction of their consequences by means of physical culture. Nowadays the COVID-19 range of problems is being actualised [9, 11]. Narrative, existential, ontological, temporal and transdisciplinary [25] approaches and archetypal psychology as well as the ideas of self-knowledge are used, and the use of the tradition of self-care is actualised [41, 43–45]. Within the framework of the application of the idea of self-knowledge [44], the teachers are recommended to test various exercises, methodologies and technologies of physical culture and health preservation by way of "testing" them first on themselves. It is also required for their professional, appropriate and optimal application or selection. Both during the period before the quarantine and at present, within the framework of the above-mentioned methodology, digital technologies are used, in particular, the work with the Internet resources, including augmented reality, virtual reality, distance learning (under conditions of quarantine) and cloud technologies.

This methodology is formed using the idea of hierarchisation of knowledge, meanings, values and strategies of health preservation. This is realised on the basis of hierarchisation of the importance of certain knowledge, skills, meanings and values as well as personal qualities for the purpose of optimising, professionalising and technologising preservation of health and life. A similar approach exists in medicine (but mostly without a formal singling out of levels). Besides, it corresponds to human nature, in which values, meanings and to some extent knowledge are hierarchical. This approach contributes to the development of such skills of a teacher: to actualise, conceptualise, problematise and foresee (anticipation aspect) complex situations as well as to act in an optimal way, rationally, technologically, quickly, using established schemes, algorithms of technological values and meanings and on the basis of singling out central and most serious problems. Accordingly, we single out 3 levels (see figure 2):

A – (one) – “Knowledge and skills in preserving life”. Metaphorically, this is “Human Life”. These are

knowledge and skills that, first of all, concern life preservation and to some extent health. In this educational system, the greatest attention is paid to the knowledge of level A.

B – (two) – “Knowledge and skills in preserving health”. Metaphorically, this is “Human Health”. These are knowledge and skills that, first of all, concern health preservation and formation as well as adapting to the environment.

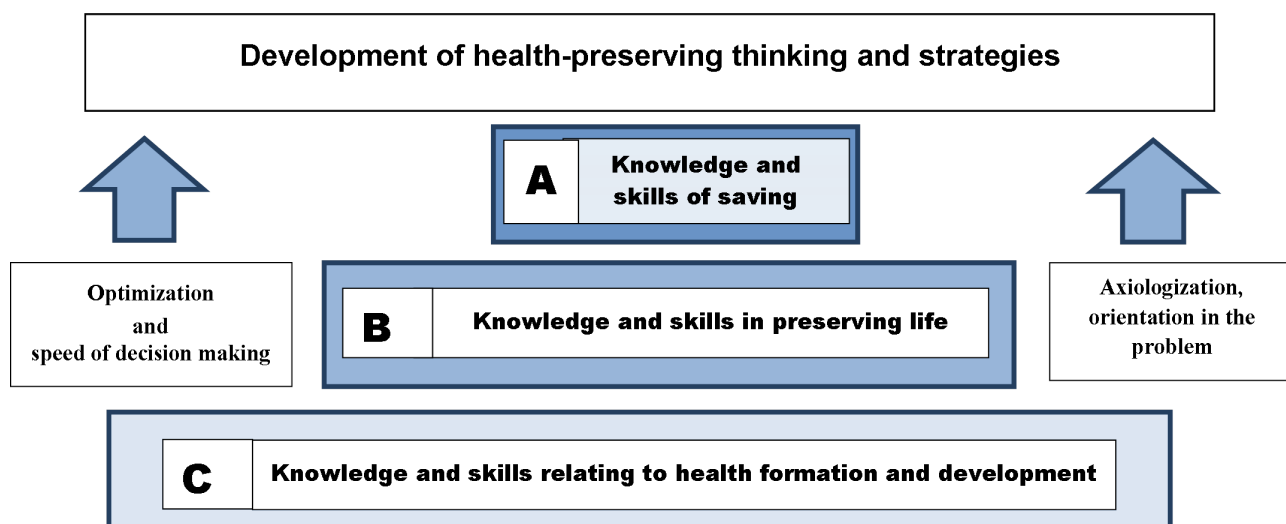
C – (three) – “Knowledge and skills relating to health formation and development”. Metaphorically, this is “Human development and he/she is in the world”. These are knowledge and skills that, first of all, are aimed at the comparable development of health and fitness. They also aim at personal development, the realisation of sustainable development goals, socio-cultural and professional adaptation and inclusion.

A fragment of “The methodology of developing health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases” is presented (in a somewhat abridged version) by 5 pedagogical tasks. These tasks are used both for training and controlling the level of knowledge. The presented variant of tasks is used to control knowledge, intellectual skills, strategies and values of health preservation and, in general, the readiness of a teacher for the realisation of health-preserving activity.

A variant of tasks, which is used for training, reveals the problem in a more extensive and detailed way and is also discussion oriented. When considering such a task in class, the problem revealed in it is analysed quite widely, using the gnosiological and activity potential embedded in the disciplinary and methodological matrix of the competence as well as using problem-based, systemic, existential, narrative and maieutic approaches. Not only separate tasks are analysed, but the systems of tasks and questions as well as strategies, values and cognitive schemes aimed at preserving health which are formed on their basis. The use of pedagogical tasks and analysis of certain pedagogical situations and anthropological phenomena are central to this methodology.

To control the knowledge, intellectual skills and readiness of a teacher to implement a health-preserving activity, pedagogical tasks and questions were used which were formed in the format of test tasks. Let us present a fragment of such a case of problems. It consists of five tasks. In total, 8 tasks were used. In addition, we used the questions presented as test tasks (10 in number). In addition to determining the level of knowledge, the use of the tasks was aimed at deepening the practice oriented knowledge in this area and forming health-preserving thinking, intentionality, goal setting and motivation of a teacher by “immersion” into a purely practical range of problems. Thus, the purpose of applying pedagogical tasks and as a whole of this methodology was the development of: cognitive (intellectual and axiological), activity and discursive as





**Figure 2.** Schematic representation of the hierarchy of knowledge, meaning, values and health strategies. There are three levels - A, B, C.

well as personal and existential components of the health-preserving competence of a Physical Education teacher. This paper mainly considers the development of the cognitive component based on the transfer of special knowledge about bronchitis and influenza, and the ideas, values and meanings of health preservation as well as by way of actualisation of the comparable intentions and cognitive and professional guidelines. Thus, the purpose of application of pedagogical tasks and this methodology as a whole was the development of: cognitive (intellectual and axiological), activity and discursive as well as personal and existential components of health-preserving competence of a Physical Education teacher. This paper mainly considers the issues of the development of the cognitive component based on the transfer of special knowledge about bronchitis and influenza and ideas, values and meanings of health preservation as well as by way of actualisation of the comparable intentions and cognitive and professional guidelines. The examples of the tasks are given below. The title of the task reflects its practical health-preserving essence.

The students were recommended to complete a pedagogical task by choosing a correct comment to a recommendation.

*Task No. 1 – “Prevention of complications of acute rhinitis”.*

*Recommendation.* If in contrast to a relatively good general condition and health, a child has: general weakness combined with the active secretion of mucus from the nose, that is, there are signs of acute inflammation of the nose (rhinitis), then to preserve health and strengthen the immune system the following is recommended: deep breathing as well as physical exercise and breathing exercises which include deep and intense breathing.

*Comment (answer):*

1. Physical exercise and motor modes, the structure which includes deep and intense breathing in acute inflammation of the nose (rhinitis), contribute to the increase in oxygen in the blood, improve blood cir-

ulation in the lungs, cleanse the respiratory system and body, which in total contributes to rapid recovery. In influenza and acute respiratory diseases, this will speed a patient’s rapid recovery and prevent complications.

2. Strenuous physical exercise and deep breathing in acute rhinitis will not only significantly increase the risks and accelerate the occurrence of complications such as acute bronchitis (inflammation of bronchial tubes) and, in some cases, pneumonia. In addition, breathing exercises in acute rhinitis do not affect the immune system in any way, but only contributes to health problems. In influenza and to a much lesser extent in acute respiratory diseases, this will increase the likelihood of severe form of the disease and the risk to life.
3. Strenuous physical exercise and deep breathing in acute rhinitis neutrally affect health without improving or worsening the condition.
4. Without strenuous physical exercise and deep breathing in acute rhinitis, the recovery is significantly complicated. These very methods are the basis for the prevention and treatment of acute rhinitis using before-doctor means. At the same time, immunity significantly improves, which is especially important in influenza and acute respiratory diseases.

*Task No. 2 – “Prevention of complications of bronchitis”.*

*Recommendation.* If a child has a cough, then deep breathing, physical exercise and breathing exercises that include deep and intense breathing are recommended to preserve good health and strengthen the immune system.

*Comment (answer):*

1. Physical exercise and motor modes, the structure which includes deep and intense breathing, when

coughing that is mainly a sign of bronchitis, contribute to the increase in oxygen in the blood, improve blood circulation in the lungs, cleanse the respiratory system and body and improve immunity, which in total contributes to rapid recovery. In influenza and acute respiratory diseases, this will contribute to a quicker recovery.

2. If you have a cough, that is mainly a sign of bronchitis, strenuous physical exercise and deep breathing will lead to the spread of infection throughout the lungs and increase inflammation. Accordingly, this will significantly increase the risks and accelerate the occurrence of such life-threatening complications of bronchitis as pneumonia. Besides, deep breathing in this case does not affect the immune system in any way, but only contributes to health problems. In influenza and to a lesser extent in acute respiratory diseases, this will increase the likelihood of severe form of the disease and lead to a substantial increase in life-threatening risks.
3. Strenuous physical exercise and deep breathing in bronchitis neutrally affect health without improving or worsening the condition.
4. Without strenuous physical exercise and deep breathing in bronchitis, the recovery is significantly complicated. These very methods are the basis for the prevention and correction of bronchitis using before-doctor means. Besides, immunity significantly improves, which is especially important in bronchitis caused by influenza and acute respiratory diseases.

*Task No. 3 – “Prevention of sudden cardiac death after influenza”.*

*Recommendation.* Strenuous physical exercise including breathing exercises is recommended after influenza. Such a relatively intense training process will lead to the cleansing of the lungs and body from waste products and its rapid rehabilitation and recovery.

*Comment (answer):*

1. Relatively strenuous physical exercise and deep breathing after influenza improve cardiac performance, which in total contributes to rapid rehabilitation and recovery. In influenza, it will contribute to a quicker recovery.
2. Strenuous physical exercise and deep breathing after the previous influenza neutrally affect health without improving or worsening the condition.
3. Without strenuous physical exercise and deep breathing after the previous influenza, the recovery is significantly complicated. These very methods are the basis for the recovery of the cardiovascular system and body as a whole after influenza or after acute respiratory diseases. This significantly improves immunity, which is especially important for the recovery of the cardiovascular system and body after influenza.

4. Relatively strenuous physical exercise and deep breathing after the previous influenza will significantly increase the risk of emergence of acute heart diseases, in particular, sudden cardiac death. In influenza, this will increase the likelihood of acute cardiac pathology, in particular, sudden cardiac death, and lead to a substantial increase in life-threatening risks. This is due to the fact that the influenza virus, in addition to the bronchial mucous tunic, affects the microcirculatory bloodstream (the smallest vessels of the body) of the whole body, including such vital organs as the heart, brain and kidneys.

*Task No. 4 – “Prevention of heart disorders due to the influence on respiration”.*

*Recommendation.* Which of the recommendations aimed at synchronising the steps with breathing while running is optimal and “more” physiological (appropriate to human nature): “During the run, one inhalation is recommended for two steps and one exhalation for three steps or vice versa (one inhalation for three steps and one exhalation for two)”. Another variant of an answer is possible. Comment on your answer using modern physiological and psychophysiological notions.

*Comment (answer):*

1. While running, it is better to inhale for three steps and exhale for two. Breathing control will contribute to the proper organisation of physiological and mental processes and indicate a developed will and consciousness of a person. It will also contribute to health improvement. During influenza and acute bronchitis, the above-mentioned control over the respiratory function will significantly improve health.
2. The most acceptable and physiological is almost complete absence of conscious and purposeful synchronisation of breathing and running. During the run, the synchronisation process is automatic and unconscious. Conscious and relatively long-term control of respiration and the attempts to synchronise it with movement will lead to desynchronisation of the respiratory and cardiac systems, which will increase the risk of acute cardiac pathology, including sudden cardiac death. In influenza and acute bronchitis, this control of the respiratory function will significantly increase the risks to life and health.
3. While running, it is better to inhale for two steps and exhale for three. Breathing control will contribute to the proper organisation of physiological and mental processes and indicate a developed will and consciousness of a person. It will also contribute to health improvement. During influenza and acute bronchitis, this control over the respiratory function will significantly improve health.
4. During the run, the presence of “total” control over breathing or its absence will not affect health in any way, including cardiac one.

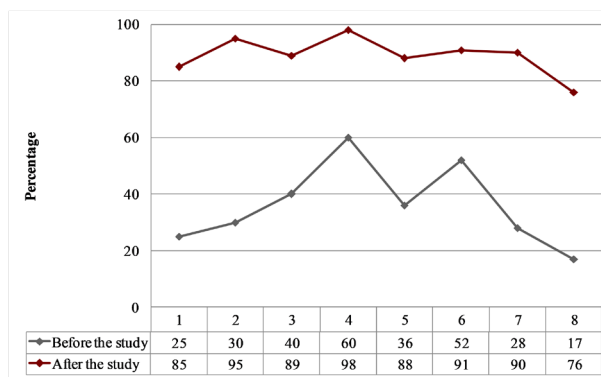
*Task No. 5 – “Prevention of movement structure disorders (running) due to the influence on respiration”.*

*Recommendation.* Which of the recommendations aimed at synchronising the steps with breathing during the run is optimal and “more” physiological (appropriate to human nature): “During the run, one inhalation is recommended for two steps and one exhalation for three steps or vice versa (one inhalation for three steps and one exhalation for two)”, which will contribute to the improvement of a training process and corresponding rise in results. The other answer is possible. Comment on your answer using modern physiological and psychophysiological notions.

*Comment (answer):*

1. While running, it is better to inhale for three steps and exhale for two. Breathing control will contribute to the proper organisation of physiological and mental processes and indicate a developed will and consciousness of a person. It will also contribute to the improvement of movement structure and its coordination and, in general, will increase the efficiency of a training process. In addition, during influenza and acute bronchitis, this control over the respiratory function will significantly improve health.
2. While running, it is better to inhale for two steps and exhale for three. Breathing control will contribute to the proper organisation of physiological and mental processes and indicate a developed will and consciousness of a person. It will also contribute to the improvement of movement structure and its coordination and, in general, will increase the efficiency of a training process.
3. During the run, the presence of “total” control over breathing or its absence will not affect the structure of movement (running) in any way.
4. The most acceptable and physiological (in the sense of appropriate to nature) is almost complete absence of conscious and purposeful synchronisation of breathing and running. Besides, the synchronisation process is partially automatic. This is due to the fact that while running, the respiratory function, according to its physiological and semantic significance, is secondary towards motor activity. That is, running is not formed on the basis of breathing goals. On the contrary, breathing provides the realisation of running. At the same time, respiration is the primary functional system that ensures running (according to P. Anokhin’s doctrine of functional systems) of type one.

The specified functional system, based on the innate internal automatic mechanisms, adapts to motor activity “on its own”. Conscious control over breathing and the attempts to synchronise it with the movement will disrupt the entire structure of running and turning it into a “breathing–running” exercise. A runner will change the goal of running as a process of moving in space. This “spatial and motor goal” will be transformed into the goal



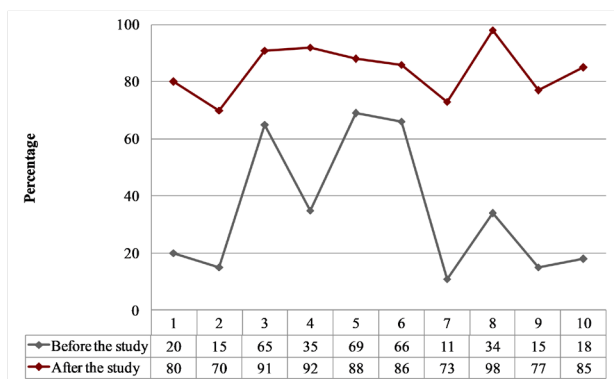
**Figure 3.** The results showing the number of correct answers of Physical Education teachers to the tasks before and after the implementation of “The methodology of the development of health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases”.

of control over the physiological process – over breathing. This will be realized in the person himself/herself – in his/her psyche and in physiology. That is, the traditional structure of goals and meanings characteristic of running is destroyed. During influenza and acute bronchitis, this control over respiratory function will significantly increase the risk of emergence of acute cardiac pathology.

*Experimental study.* The experimental study, which was conducted in 2017–2018, involved 816 Physical Education teachers. The experimental group included 411 people. The study was conducted at 9 higher educational institutions in Ukraine: Drohobych Ivan Franko State Pedagogical University, Chernihiv Regional Institute of Postgraduate Pedagogical Education named after K. D. Ushinsky, Sumy Regional Institute of Postgraduate Pedagogical Education, Mykolaiv Regional Institute for Postgraduate Pedagogical Education, Zaporizhzhia Regional Institute of Continuing Pedagogical Education, Donetsk Regional Institute of Postgraduate Teacher Education, Zhytomyr Regional Institute of Postgraduate Pedagogical Education, Kherson Academy of Continuing Education, Lviv Regional Institute of Postgraduate Pedagogical Education.

The analysis of the results of the study showed that after the introduction of the methodology of developing health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases, in the experimental group there was a positive dynamics of academic achievements of Physical Education teachers (see figure 3, figure 4). The figures show the dynamics of the survey results of Physical Education teachers before and after the introduction of this methodology. Figures show the percentages of correct answers to the questions of 8 problems and 10 tests respectively.

Let us prove the statistical confidentiality of the obtained results. The number of tasks that had to be completed by the Physical Education teachers before and after the implementation of the methodology of development of health-preserving competence of Physical Edu-



**Figure 4.** The results showing the number of correct answers of Physical Education teachers to the questions of the tests before and after the introduction of “The methodology of the development of health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases”.

Physical Education teachers based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases  $n_1 = 18$  and  $n_2 = 18$ .

Let us confirm the statistical significance of the difference between the mean values of the two samples before and after the implementation of this methodology in the experimental group with the help of Student’s t-test [50]:

1. We check the normality of the data distribution in samples  $X_1$  and  $X_2$  before and after the implementation of the methodology respectively.

The empirical values of skewness calculated by formula (1) in samples  $X_1$  and  $X_2$  are equal to  $Skew_1 \approx 0.5$ ,  $Skew_2 \approx -0.43$  respectively. The critical value of skewness, calculated by formula (3) is equal to  $Skew_{crit} \approx 1.52$ . We compare the empirical values of skewness with the critical one.  $Skew_1 \approx 0.5 < Skew_{crit} \approx 1.52$ ,  $|Skew_2| \approx |-0.43| < Skew_{crit} \approx 1.52$ .

The empirical values of excess kurtosis in samples  $X_1$  and  $X_2$  calculated by formula (2) are equal to  $Kurt_1 \approx -1.26$ ,  $Kurt_2 \approx -0.91$  respectively. The critical value of excess kurtosis calculated by formula (4) is equal to  $Kurt_{crit} \approx 3.86$ . We compare the empirical values of excess kurtosis with the critical one.  $|Kurt_1| \approx |-1.26| < Kurt_{crit} \approx 3.86$ ,  $|Kurt_2| \approx |-0.91| < Kurt_{crit} \approx 3.86$ .

Since the empirical values of skewness and excess kurtosis for both samples  $X_1$  and  $X_2$  respectively are less than the critical values of skewness and excess kurtosis, we make a decision that the data in samples  $X_1$  and  $X_2$  are distributed according to the normal distribution law.

2. We check the availability of a direct correlation between samples  $X_1$  and  $X_2$ . Since the sample data  $X_1$  and  $X_2$  are distributed according to the normal distribution law, we can use the Pearson correlation coefficient  $r_{x_1, x_2}$ .

We formulate statistical hypotheses:

$H_0$ :  $r_{x_1, x_2} = 0$ , no correlation between sample data  $X_1$  and  $X_2$ ;

$H_1$ :  $r_{x_1, x_2} \gg 0$ ,  $p < 0.05$ ; there is a direct correlation between the sample data  $X_1$  and  $X_2$ , which is significant at the level of 0.05.

The Pearson correlation coefficient  $r_{xy}$  is calculated by formula (5),  $r_{x_1, x_2} \approx 0.61$ .

According to the table of critical values Pearson correlation coefficient, significance level  $p < 0.05$ ,  $r_{crit} = 0.47$ . Therefore,  $r_{x_1, x_2} \approx 0.61 \geq r_{crit} = 0.47$  – we accept hypothesis  $H_1$  that there is a direct correlation between the data of samples  $X_1$  and  $X_2$ , significant at the level of  $p < 0.05$ .

3. Since the data of samples  $X_1$  and  $X_2$  are distributed according to the normal law and there is a direct correlation between them, in this case we can use Student’s t-test to compare these samples. We formulate statistical hypotheses:

$H_0$ : the differences between  $X_1$  and  $X_2$  are random and insignificant;

$H_1$ : the differences between  $X_1$  and  $X_2$  are trustworthy and significant.

The empirical value of Student’s t-test for samples  $X_1$  and  $X_2$  is calculated by formula (6)  $t \approx 13.75$ .

Critical value in the table of critical values of Student’s t-test with the degrees of freedom  $df=18-1=17$ ,  $t_{crit} = 2.11$ ;  $t \approx 13.75 > t_{crit} = 2.11$ , we accept hypothesis  $H_1$ .

Therefore, we conclude that the differences between  $X_1$  and  $X_2$  are trustworthy and significant. That is, differences in the percentage of correct answers of Physical Education teachers to the questions and tests before and after the introduction of the methodology of developing health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases are significant.

## 4 Conclusion

As a holistic professional and personal, activity and cognitive phenomenon, the health-preserving competence of a Physical Education teacher is aimed at forming a healthy lifestyle and meaningful and purposeful risk management. This includes, above all, the prevention and correction of major problems, conditions and pathologies. One of the central problems represented in the format of prevention and correction of pathology is acute bronchitis that occurs as a manifestation of influenza, in particular, COVID-19 and acute respiratory diseases.

For a Physical Education teacher, this range of problems has both health-preserving and life-saving significance. The presence of the COVID-19 pandemic dramatically increases the risk of life-threatening conditions and pathologies, especially those that can be triggered by physical exercise. The relevance and professional significance



of knowledge for a Physical Education teacher are determined by the factors of prevention of acute bronchitis, influenza, COVID-19 and acute respiratory diseases.

The essential methodological strategy for improving health-preserving competence of a Physical Education teacher under conditions of the postgraduate education that is presented by “The Disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher”. This matrix is a six-level epistemological system in which knowledge is transferred among different levels. In the end, this leads to a practice oriented direction of knowledge about human nature as well as to their specification (concretisation), technological and axiological orientation. The matrix is formed according to the system and target principles and is aimed at professionalisation, methodologisation, technologisation, anthropologisation, axiologisation of health-preserving competence of a Physical Education teacher as well as knowledge about health and educational practices and technologies of health preservation of participants of an educational process. The system of the above-mentioned matrix uses the following developed by us “integrated disciplines”: “Pathopedagogy”, “Health Propaedeutics” and “Health Therapy”, which are both equal and sequential stages aimed at the development of all components of health-preserving competence. Due to the application of this matrix and the developed “integrated disciplines”, the knowledge about a human both under normal conditions and under conditions of stress and pathology is integrated, axiologised and anthropologised being included in the structure of health-preserving thinking and also becoming a cognitive and axiological basis of values, meanings, intentions, actions, and strategies as well as improvement and manifestation of professionally oriented psychological and characterological qualities.

A methodological basis of educational and methodological activity is presented by ‘Methodology of developing health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases’. The methodology is based on the competency approach, “The disciplinary and methodological matrix of health-preserving competence of a Physical Education teacher”, problem-based and flipped learning, andragogy, game, maieutic and dialogic methods as well as narrative, existential, anthropological, humanistic approaches, as well as the ideas of self-knowledge, the Hellenistic concept of “self-care” (according to M. Foucault) and others.

Central to the methodology is the use of pedagogical tasks, as well as the analysis, examination and interpretation of complex pedagogical and life situations and issues. The use of pedagogical tasks and analysis of situations of this methodology as a whole is aimed at improving: mainly cognitive (intellectual and axiological), as well as for the development of activity and discursive, personal and existential components of health-preserving competence of a Physical Education teacher.

Within the framework of this methodology, the knowledge, values and practical strategies for maintaining health, which are formed on the basis of them, are hier-

archised with the singling out of three levels: A – (one) “Knowledge and skills of preserving life”, B – (two) “Knowledge and skills in forming health and development”, C – (three) “Knowledge and skills about health formation and development”. Level A is obligatory for full understanding and practical use; levels B and C are less significant so they are given less attention.

The analysis of the results of the study using Student’s t-test showed the effectiveness of the implementation of “The methodology of developing health-preserving competence of a Physical Education teacher based on the knowledge of prevention of acute bronchitis, influenza and acute respiratory diseases”. It was established that the level of academic performance of Physical Education teachers in the experimental group after the introduction of this method was significantly higher than the level of academic performance of Physical Education teachers before the research. First of all, this concerns the first 5 tasks related to level A, which is obligatory for full acquisition. A significant gap in the knowledge between the initial level (before the training) and after the training is explained by the novelty of this knowledge and area in general, practical significance and relative interest of the teachers, the use of the hierarchy of knowledge as an effective teaching technique owing to which the technology oriented meanings, strategies and axiological attitude to solving problems of prevention of bronchitis and influenza as well as correction of their consequences are formed by means of physical culture.

The presented methodology and methods, as well as approaches, visions and directions aimed at developing health-preserving competence of a Physical Education teacher and preserving health under conditions of an educational process, are correlated with the classical idea of “health as a good” (in essence, an interpretation of an ancient Greek concept of *agata*) of H. Sigerist. These methodologies and methods are humanistic, ecocentric and those that are consistent with the spirit, ideology and sustainable development of goals, among which the preservation of health and motor activity are presented as essential and system-organizing.

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## The principle of “incomplete comprehension of object” in the context of the discourse of uncertainties in a digital society

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**Abstract.** The article deals with the analysis of situations of uncertainty in various spheres of modern society life that have arisen as a result of the rapid development of digital technologies; virtualization of many components of modern human life; the increasing role of visual information in communication; drastic changes in the labor market, in intellectual practices and the formation of new requirements for the education and vocational training system. We have proposed to analyze such situations using the principle of “incomplete comprehension of object”, and we carried out a consideration of its content and indicated its methodological role. To our mind, one of the most important features of this principle is the focus on a set of ambiguous, non-obvious links between the internal elements of an object, as well as during its interactions with agents of external influence in a situation of uncertainty. Besides, we examined its heuristic and predictive capabilities using examples of analysis of specific typical situations in various spheres of social life, primarily related to the labor market and education in a digital culture.

### 1 Introduction

In the context of Industry 4.0 and the rapid development of digital culture, a person is required to quickly and efficiently adapt to new ICT in production and everyday life [1, 2], professional orientation of a person, starting with junior and middle, and not only senior school age [3] education or self-education through massive open online courses [4–7], training in general secondary education institutions [8–11]. However, the development of digital technologies and their mass distribution leads not only to positive changes in the material sphere of human life, but also to some inconveniences and risks [12, 13]. We are talking not only about the risks for an individual, but also about the prospects for the development of society and the future of humanity as a whole.

One of the important problems is the dramatic changes in the labor market in many countries, and this situation has obvious features of the object of analysis with many unknown qualities [14–16]. To develop an effective strategy for adapting to it, it is necessary to take into account extremely large amount of factors influencing such a situation, i.e. its determinants and conditions. Some countries are considering introducing an unconditional basic income, for example in Finland; reduction of working time to a 6-hour working day or introduction of a working week shortened to 3–4 days (Australia, Sweden) [17]. But there

are other equally important problems associated with digital culture. A person is not like clockwork that can be complicated and complicated: here it is enough to recall the answer of the Swedish queen Christina to her opponents about their enthusiasm for the development of technology, the first machines and machine production in the modern era. The social consequences of the technical advances of the day were ambiguous. On the one hand, this is a sharp return on capital and an interest in machine production. But the sharp impoverishment of a significant number of people caused a change in the way of life and the needlessness of the previous number of workers, and social protests as a result (for example, there are the Luddite movement and the desire to destroy machines during the first industrial revolution on the part of workers in factories and artisans), on the other hand. However, the third important point of changes in the Europeans’ way of life of that period was the change in the paradigm of teaching and education in general.

Since the late 1990s, and especially the last few years, we have been observing a similar situation, a kind of socio-cultural “refrain” of radical, rapid and incomprehensible in terms of prospects for changing the way a person’s daily life and the existence of society. This is happening due to the development of digital technologies and the digitalization of different spheres of life.

The object of this research is the content of the principle of “incomplete comprehension of object”, its heuristic and predictive capabilities when considering risks and prospects for the development of modern society and a person in conditions of digital culture. The purpose of the study is to analyze the principle of “incomplete com-

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prehension of object” and its methodological value, as a component of the method of system analysis of complex phenomena, when considering modern phenomena, social processes and abrupt changes in various spheres of human life: production, everyday life and leisure, cultural development, education and upbringing.

## 2 Review

The problem of incomplete comprehension of objects, which is the important influence factors, is need for understanding the causes of the situation of uncertainties in modern people’s life and its insecurity, anxiety and difficulties in adapting to the conditions of digital culture, virtualization and digital technologies. However, it is poorly studied. We pointed out the methodological value of “incomplete comprehension of object” principle when analyzing the phenomena of symbolic production and exchange during visual communication in the context of digital culture [18]. As a phenomenon of cognitive and epistemological order, André J. Abath considers the phenomenon of incomplete comprehension of object at the research process, linking it with the logic of understanding concepts by a person and partial interpretation of their content. The researcher pays special attention to the ratio of true knowledge about the research object with one of the false beliefs [19]. Some researchers point out the importance of studying the problem of incomplete knowledge [20, 21]. But Pedro Lima and João Gonzalez [22] point out the importance of studying the problem of programming robotic systems in conditions of incomplete comprehension of object. A group of Canadian scientists headed by Shahryar Rahnamayan, while analyzing the problem of incomplete comprehension of object, focused on the study of the phenomenon of recognition. Scientists suggest that when solving complex problems, “genetic algorithms” and operations on morphology, image processing procedures can be effectively used by a person [23]. According to researchers, the problem of recognition is important, given the importance of visualization in the life of contemporaries. At the same time, the authors indicate the presence of a “common reference sample, regardless of a priori knowledge” as a key characteristic of the recognition procedure [23]. It is important to point out, that researchers, while generally recognizing the value of analyzing the problem of incomplete comprehension of object, have not yet developed a unified model of its interpretation both in terms of content and practical significance.

Therefore, the principle of “incomplete comprehension of object” development within cognition process in terms of methodology is important and promising. This principle develops the prognostic field and heuristic potential of the system analysis of complex social phenomena and processes method, creating the prerequisites for effective orientation in the context of modern information and communication technologies.

## 3 Discussion and results

### 3.1 A methodological setting of “incomplete comprehension of object” principle

What does the principle of “incomplete comprehension of object” imply in the study of complex social objects, processes and phenomena? The importance of its development, as we assume as a hypothesis, is due to the fact that social life is:

- 1) a nonlinear system and therefore many links between its components are ambiguous, i.e., they cannot be considered “rigid”, stable, constantly reproducing, especially during the period of rapid development of new technologies and materials;
- 2) it is important to consider the life of mankind and society as a dynamic phenomenon, some of the causes and consequences of which are implicit in perception, and therefore difficult to understand, interpret, but their ignorance or not paying proper attention to them can lead to social destruction, instability, regression;
- 3) there are cognitive limits in social cognition, individual learning, vocational education, when it comes to rapid changes in the way of life;
- 4) ideological attitudes and the value sphere of life, both of an individual and group, are more conservative, stable elements of a person’s spiritual life rather than his knowledge in the professional sphere.

We want to draw attention to the emphasis which this principle is used for. According to it within cognition process it is necessary to identify and take into account the totality of ambiguous links between the internal elements of the object, as well as in its interaction with agents of external influence. It’s them in their totality that constitute the field of uncertainty in the existence of complex objects (due to the number of components, a variety of external factors of influence, constant variability of elements or / and factors of influence). Such connections do not have a “hard” manifestation, i.e., they are probabilistic by nature (or at least are perceived to be ones).

Secondly, it is impossible to form an idea of the qualitative parameters of something or the properties of someone, based only on quantitative data. Of course, when trying to comprehend any social object, it’s important to focus on the representativeness (typicality) of the observed events, phenomena, processes in everyday life.

Thirdly, the principle of “incomplete comprehension of object” implies the value of focusing attention on “agents of unusual reaction” to situations with a wide range of consequences. We believe that it is not necessary, of course, to detect the latter according to the principle of “grid in the sea”, on the contrary, it is necessary to look for people or phenomena (processes, variables) which can be considered just atypical, unlike others, and they are quite striking. To our mind, in conditions of digital culture, “agents of an unusual reaction” are people whose reaction (primarily sensual) to what is happening in typical situations is unusual, unlike the reactions of other people.

As an example, such a situation can be working with text, when word recognition is one of the first moments of its understanding. However, in addition to defining their meaning, there can be another level of human work on the text. Steve Mckee stated that reading is more than letter recognition, but involves determining meaning and context: “Direct or indirect connections are made between the information. As the information is processed, comprehension is developed. ... Meaning is assigned by using prior knowledge, looking at discourse structure, and context” [17]. To our mind, an unusual reaction of a person when perceiving a text is his attention to the context or indirect links between blocks of information. It doesn't matter which text it is (descriptive, narrative, explanatory, or argumentation). Moreover, not each of “poor comprehenders” [24] is, as we consider, an “agent of unusual reaction” to new information. In this case, the age or education of a person does not matter; it is his reaction to the interaction of basic (explicit) information and context (implicit) information in the text that is important. In other words, an important point is a person's ability (innate or arising from learning and training) to pay attention to the context of the situation or the implicit information contained in the text, message.

To our mind, paying attention to “agents of an unusual reaction” makes it possible, by analogy, to compare the typical with the atypical and identify both necessary and variable moments (properties, connections, elements of the external or internal structure) of an object that is important for analysis and discourse.

Therefore, such a methodological setting of “incomplete comprehension of object” principle will be useful when considering stochastic processes in modern society and studying any object: abrupt changes in the conditions of everyday life as a consequence of the increasing importance of digital technologies, the strengthening the role of visualization and symbolization of thinking in information processes, rapid modernization of some spheres, etc. (For example, the emergence of innovative digital programs, accordingly, causes necessity of rapid development of new training programs, and then you need to quickly understand the value of the latter).

Fourthly, the principle of “incomplete comprehension of object” directs the researcher not only pay attention to “agents of external influence” (based on analytical analysis). In such a case it is important to analyze the value and worldview basis of the life of “agents of an unusual reaction” (through observation, phenomenological reduction, and experiment). In our opinion, it is necessary to pay attention to the following point. First of all, it is important to understand how coherent their reaction to what is happening is, in order to reveal a tendency towards similarity in emotional and sensory responses, assessments, and actions. And if such a tendency is recorded, then one can try to simulate a general portrait or several of its profiles among “agents of unusual reaction”. On its basis, it is important to identify not only latent motives for activity, intentions, incentives and preferences, fears or complexes, but also a group of social irritants as objects of hostility / sympathy.

The latter will be of the greatest interest, since they make it possible to identify implicit factors of influence during a sharp change in the way of everyday life, and this is precisely what is happening now with the massive introduction of digital technologies, virtualization of the life of society and the requirements for continuous education and self-education of workers. And the main reason for the latter is the constant updating of software, development of new devices and materials, means of communication and communication, etc.

In other words, it is important to focus the locus of attention of the researcher, mainly, not on positive moments, but on negative experience, primarily in human sensory reactions to novelty and innovation.

After all, the rejection of the requirement of constant software updates for office equipment or the acquisition of more and more new phone models is also a human reaction to the excessive fascination of modern society with “technical toys”. It is not necessarily determined by its inability to quickly learn new technologies. On the contrary, such a reaction may be a manifestation of an extremely critical understanding that he does not need to follow fashion for a new trend and a sober calculation of his expenses.

### **3.2 The practical implementation of “incomplete comprehension of object” principle**

The principle of “incomplete comprehension of object” focuses on the system analysis of complex objects in the context of their rapid transformation. It also expands the possibilities of modeling social objects. The principle of “incomplete comprehension of object” using for analysis makes it possible to adequately model the situation, one of the main features of which is uncertainty in understanding the determinants and conditions of its existence, the prospects for its development, etc. Uncertainty leads to different assessments of such situations on the part of contemporaries: understanding / misunderstanding, acceptance / rejection (depending on their personal understanding and preferences, as well as the influence of collective experience).

The main reason for the uncertainty in people's life in the conditions of Industry 4.0 and the anxiety caused by it is associated with the pressure of digital technologies and artificial intelligence on a person which is made by means of computational methods and information technologies. That makes some people change their professional specialty, typical for routine functions and jobs [25]. As a result of it modeling professional growth is based on intellectual analysis helps to discover more attractive activities, develop creative abilities [26]. For that reason, in a rapidly changing environment, only adequate proposals of educational institutions will help professionals effectively develop their careers [27]. Therefore, the practical implementation of the study, first of all, concerns the assessment of the professional orientation of modern youth, since Industry 4.0 technologies determine the rapid transformation of the labor market and new requirements for general and vocational training, as well as create new conditions for

learning (massive open online courses [4]; cloud technologies and cloud services [28]; game simulators [29]). It should be noted that the changes concern various professional areas.

For example, the admission of a young person to the university depends on many factors, as well as his successful education or, conversely, unsuccessful performance results, and besides, his admission and graduation from this institution are mediated by many variable factors. These factors become especially uncertain in the absence of social stability for various reasons.

We point out that, such external factors are now distance learning for pupils and students thanks to the Zoom platform because of the Covid-19 pandemic (factor a), as well as a greater opportunity for their access to products of popular art and culture due to digital technologies (factor b). Both factors simultaneously influence the motivation to learn (goal a) and motivation for fun (goal b), including using the time allocated for learning and self-study (goal c). But the second of them was known and could be taken into account, while the first factor is completely unexpected and therefore unpredictable in its consequences at the moment. However, their simultaneous existence can lead to a spectrum of consequences, and they will be unequal for influence in different groups and in different countries. Then the “fan of possibilities” for the development of a social object becomes even more difficult to analyze. Situation 1: factor a can significantly reduce the influence of factor b (for example, through the need to spend more time on preparation and self-preparation); situation 2: factor a significantly enhances factor b (isolation from the collective has a depressive influence on a person and, as a result, his desire to acquire knowledge decreases and his desire to have fun increases, and modern popular culture gives him such an opportunity); situation 3: factor a will not affect factor b, etc. Besides, the existence of an electronic scientific / popular science book or Web book (factor c) is also a factor of influence in relation to factor a; e-book of fictional content (factor d). Such virtual objects are popular among modern youth. Therefore, factor c and factor d will also affect goal a (along the way, they will affect both goal b and goal c). Although they are not the main factors of influence, i.e. these are not obvious factors.

For other example, research made by Dell Technologies Research shows that 78 percents of workers across businesses consider digitalization to be a threat to them now and in the future; 45% of respondents are confident that their enterprises in the next 3-5 years will no longer be able to compete through digital technologies in production and communication; only 5 percents of enterprises are now leaders in the digitalization of production [1]. In modern society we now are already observing not only a decline in the popularity of many professions, but also a change in the professional active in many spheres of society. So, in the Scandinavian countries at least 90% of banking transactions are carried out online, and this leads to a drop in interest in the profession of a bank employee and a sharp decrease in the number of employees in this area. Therefore, the profession of a bank employee, which not long ago gave a person a stable and sufficiently high income

and ensured social prestige, will lose its attractiveness for young people. In November 2020, Juniper Research indicated that the number of mobile users by 2025 will increase from 980 million (current year period) to 1.2 billion [14]. According to Juniper Research, this means that in the next 5 years, at least 30 percents of users in this market will only use financial services online. (We believe that the group represents those who are able to quickly adapt to the situation, i.e., “agents of unusual reaction” of the first type, adherents of digital culture). How correct this forecast is? It should be mentioned that the forecast doesn't take into account the conservatism of human thinking, unwillingness to learn innovative and rapidly changing digital technologies, etc. Besides, the rapid development of technology causes dramatic changes in the usual way of life, the emergence of new professions and the disappearance of other ones; as a result, we face the loss of jobs by many people, impoverishment and social protests. (We should remind, that during Industry 1 in England, the industry began to actively develop as a result of which many peasants lost the land, the mass pauperization of the population took place, “workhouses” appeared, the Luddite movement started and there appeared a saying “Sheep began to eat people”. As the illustration to those processes, we can name the paintings of an eyewitness, Hogarth “Gin Lane” and others. At the same time during Industry 1 positive processes started: the development of science, emergence of the profession of a scientist, teaching and tutoring got popular). We consider, in order to develop an adequate forecast of the relevance of future profession, it is important to pay thorough attention to the “agents of an unusual reaction” of the second type, opponents of digital technologies. Only in this case we will be able to adequately assess the prospects for the development of this market and the social processes associated with it.

## 4 Conclusion

We want to pay attention to the excessive intellectual and emotional load of a modern person from new, digital technologies and many visual signals, messages that we have to deal with on a daily basis when performing professional duties, in everyday life, entertainment, education, and the like. As a result, people have many problems, first of all, chronic fatigue, self-doubt, aggressive behavior in society. In addition, the global digital sphere makes it necessary for a person to constantly learn throughout his life. The conditions for the rapid transformation of digital technologies and the dynamics of changes as a result of this in many spheres of society make it urgent to develop principles for the analysis of complex objects in order to form adequate forecasts and recommendations necessary to minimize destruction in social life. The principle of “incomplete comprehension of object” is able to fulfill this methodological heuristic and predictive role.

It seems to be important for orienting the researcher in the discourse of complex phenomena that occur in a digital society. One of their important features is uncertainty, especially in terms of development. But uncertainty is also

recorded in the understanding / misunderstanding, acceptance / rejection of these phenomena by modern people and social groups.

The principle of “incomplete comprehension of object” focuses the attention of the researcher precisely on the uncertainty of the situation of the existence of complex objects in the conditions of their rapid changes. The principle of “incomplete comprehension of object” expands the capabilities of the system analysis method and modeling of social objects, therefore this principle will be useful in assessing the Industry 4.0 phenomenon and the rapid development of digital culture, as well as for developing medium-term and long-term forecasts in the sphere of material, social, and spiritual life of a person.

The complexity of understanding modern social processes is associated with their increased fragmentation, mosaicism and variability. This became especially evident in the situation of the Covid-19 pandemic and life under quarantine conditions, when the rules of human behavior changed significantly. Particularly alarming is the situation that has developed in the field of education, when children, adolescents and young people are forced to stay in atypical conditions for obtaining the necessary knowledge. Indeed, now in many countries distance learning is taking place thanks to new information and communication technologies, massive open online courses, game simulator, etc. are used. In fact, we have cardinal changes, even a breakdown of the existing intellectual practices and traditions of education, developed not only over the past decades, but in general since the period of the New Time and its Enlightenment project. The use of the principle of “incomplete comprehension of object” makes it possible to quickly assess the impact of this situation on their inner world, motivation for learning and the level of knowledge of our contemporaries.

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# Ecological and axiological reflection of the concept of sustainable development as a basis for the health-preserving competence of a physical education teacher

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**Abstract.** The article on the basis of the ecological value of reflection the concept of sustainable development and Hellenistic concepts is conceptual and methodological improvement of health saving competence of Physical Education teachers in the conditions of post-graduate education. There are presented methodological ways of greening of health and fitness technologies and identified opportunities for ecologically oriented their use by the teacher. Based on ecophilic interpretation of Hellenistic ideas are developed methodological concepts "Tellusantropo convergence" of the "Arete of the earth", "Tellusantropo harmonization", "Astoria of the Earth", "Tellusantropo reflection". Cultural, educational and technological sense of these concepts is existential axiological and ecophilic-oriented representation and interpretation the idea of sustainable development with the aim of using them as a Physical Education teacher in the educational health saving and fitness technologies and practices. In order to form a value relation to the Earth, to develop the "Arete of the Earth" and to unveil the "Existential of the Earth", we used the value-oriented reflexive technique of the "Epistrophe of the Earth". The method of "Epistrophe of the Earth" with its further improvement and testing can be used to form a valuable attitude to the Earth, actualization of environmental issues, formation of psychological health of participants in the educational process and actualization of the concept of sustainable development.

## 1 Introduction

Realizing the importance of futures literacy [1] and revealing the deep meanings of A. Peccei's strategies for preserving the Earth through the formation of person's qualities [2], as well as considering the value of M. Moiseev's environmental and co-evolutionary ideas [3], we actualize the educational problem of interdependent ecologization of health saving competence of the Physical Education teacher and health saving and fitness / technologies by use of Hellenistic concepts. Earth conservation issues are meaningful when considering the phenomenology of Homo Educandus health. Significant in this aspect are the understanding of the unity of a person and Earth, presented in the noospheric ideas of V. Vernadsky [4] and P. Teilhard de Chardin [5] and in the concept of "Gaia" by J. Lovelock [6]. Also decisive is humanity's understanding of its limits to growth [2, 7] and, accordingly, the emergence of persistent ideas that the world is filled (the concept of "Filled World" by K. Boulding is revealed in a report by E. von Weizsaecker, A. Wijkman et al. "Come On! Capitalism, Short-termism, Population and the Destruction of

the Planet - A Report to the Club of Rome") [1]. Together, the methodological reflection of these concepts determines the need to develop an "anthropology of sustainable development". Accordingly, the consideration of ecophilic [8] and value transformations of Homo economicus [9] brought up on the egoistic, pragmatic, technocratic, expansive and competitive installations and rationality of the modern era into a "new person" is relevant. Such a person must be merciful, kind, non-aggressive and not expansive to the planet Earth, its resources and humanity. We call these transformations Homo Sapiens "Sustainable Development Person". This "new" anthropos (ancient Greek *ανθρωπος*; "Person"; lat. *anthropos*) should, according to the ideas of A. Pecchei [2], be harmonious, tolerant, peaceful, and moderate in its consumer and financial material "claims" to the world, nature and people.

According to the above ecophilic ideas, the professional activity of a teacher should be directed to the actualization of the physical, motor and health dimensions of person's being, which is considered in a relative and co-evolutionary way [3] with the preservation of the Earth and its harmonious interaction with it. A significant person who actively influences the formation of the "Sustainable Development Person" in the cultural and educational

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space is a Physical Education teacher and trainer. Such influence is caused by the fact that the educational interaction between Physical Education teacher and students is realized not only in the spheres of intelligence, emotions, will, communication. This interaction is formed on the basis of actualization of personally and vitally important issues of the body, physicality, bodily identity, locomotion, beauty, image, health and life. That is, it is primarily vital, aesthetically and existentially oriented.

Due to the peculiarities of professional activity, Physical Education teacher has the opportunity to contribute to the disclosure of his existential [10] through his influence on physicality and locomotion of the child [10] of temporality, space, concern, heart, health, physicality. Updating the existential dimension of the child, in addition to the exercise activity and communication, is also done through interaction with the landscape. This collectively contributes to the formation of a child's understanding of the uniqueness of our planet and, accordingly, the development of a responsible, careful and caring attitude to the Earth. Important in this context is the development in children of ideas about the need for integration ("inclusion") into a single, holistic and interdependent "Filled World" [1]. For the person of the future, the defining aspect of his identity and being is the understanding that the "Filled World" has boundaries [2, 7].

In the context of the formation of a "new" "Sustainable Development Person", it is relevant to understand locomotion in psychosemantic [11] and axiological [12] meaningful personal frameworks. Accordingly, the vision of physical and fitness and health-saving technologies not only as physical (in the sense of also as motor) but also as symbolic and axiological [12] anthropopractices that contribute to the educational actualization of the problem of Earth conservation is important. The notion of motor activity as a way of forming the mental, ethical and behavioral spheres of a person has been actively used since the time of the Greek cultural and educational system of *paideia* (given by the Greek *παιδεία*) [13, 14]. We turn to ecologically oriented actualization of the problems of the body, physicality and locomotion as one of the central and starting points in the formation of a person and in revealing the phenomenology of his health.

The need for ecologically oriented understanding of bodily anthropopractices and health-saving and physical-fitness technologies is due to systemic and system-organizing issues of preserving not only the health but also the *primo loco* (above all) of the lives of children during physical education and youth. In the aspect of life preservation, the decisive and primary problem is the prevention of sudden cardiac death [15, 16] during physical education and youth sports. This problem is relevant to the vast majority of countries, which speaks to its connection with the environmental crisis. An urgent inclusive aspect that underlies the consideration of health and fitness technologies is the need to consider their impact on children with special educational needs. Also important is the aspect of cultural compliance of health and fitness and wellness technologies.

Thus, the development of a methodology for the development of health-saving competence of the Physical Education teacher, taking into account the greening of health-saving and physical-health technologies is a leading problem of our study. An important aspect of the problem is that the improvement of the methodology, which includes the greening of the health-saving conduct of technology-saving on the basis of the reception and environmentally oriented interpretation of Hellenistic concepts. This problem is not sufficiently covered in the scientific pedagogical literature. This, together with the importance of this problem for the preservation of life and health of children in the educational process, makes our research relevant.

*The aim* of our study was to improve the methodology of development of health-saving competence of Physical Education teacher in the conditions of postgraduate education and the relative and interdependent ecologization of health-saving and physical-fitness technologies, which is realized on the basis of ecological-value reflection and the concept of sustainable ideas.

## 2 Methods of the research

This study was conducted on the basis of theoretical analysis of scientific literature and a system of approaches. Accordingly, this methodological system is represented by: competent [17], health saving [18], systemic, anthropological, cultural, historical pedagogical [13], philosophical pedagogical, reflexive, hermeneutic, axiological, epistemological, epistemological, epistemological, humanistic, geopsychological [19], ethical, preventive, psychological, existential, ontological, medical and hygienic, transdisciplinary approaches and methods.

In the system of this study, the applied conceptual and methodological potential existential pedagogy (A. Bollnow) [20], existential psychology (L. Binswager) [10] and existential philosophy; dialogical pedagogy and philosophy (N. Buber) [21]; anthropology – educational, environmental, social, historical, psychological; "earth-based psychology (A. Mindel) [19]; the philosophy of cordocentrism; ancient spiritual educational system *paideia* (given by the Greek *παιδεία*) [13, 14, 22–24]. The topics covered were addressed using the sum concepts: sustainable development, "New enlightenment" [1], "Care for the Earth" (A. Gore) [25], the noosphere (V. Vernadsky and P. Teilhard de Chardin) [4, 5], "Gaia" (J. Lovelock) [6], a concepts of "Challenge and Response" by A. Toynbee [26], "Other" (E. Levinas) [27], the psychosemantics of motor actions (D. Donskoi, S. Dmytriev) [11], axiology motor area (I. Byhowska) [12], autopoiesis (H. Maturana, F. Varela) [28], enactivism (A. Knyazeva) [29], physical rationality (J. Lakoff) [30], embodied cognitive science [31, 32]; theknowledge transfer; anthropopractices and "Technologies of the Self" (M. Foucault) [33, 34], social and cultural "construction" of health and pathology (M. Foucault) [35], subjectification (M. Foucault, S. Golenkov, A. Smirnov) [36–38]. For the purpose of ecophilic and existentially oriented interpretation of the concept of sustainable development and "the Earth Charter" [39], Hellenistic concepts were used in our study

[9, 13, 14, 23, 24, 33, 34, 40–47]: agate (ancient Greek *αγαθον* – good), arete (ancient Greek *αρετη* – charity, benefits), hubris (ancient Greek *υβριζ* - pride, challenge, audacity), observance to the full extent (ancient Greek *συμμετρων, μετριον*), equilibrium of forces (ancient Greek *ισομνη*), harmony (ancient Greek *αρμονια*), reflection (lat. *reflexio*), epistrophe (lat. *epistrophe*), self-knowledge (ancient Greek *γνωθι σεαυτον*; french *gnothi sautou*) (M. Foucault) [33, 34], care of oneself (ancient Greek *επιμελεια σεαυτον*; french *epimelēsthai sautou*) (M. Foucault) [33, 34].

*Technique of “the Earth Epistrophe”*. In order to improve the health-saving competences of Physical Education teachers in postgraduate education, based on the concept of sustainable development, we have applied a value-oriented technique called “the Earth Epistrophe”. This technique included elements of “body-intellectual” psycho-techniques, mental reflection, self-knowledge, as well as communicative, dialogical and moral practices. This technique is a fragment of value-oriented anthropractics which is at the same time a pedagogical scenario, dialogue, and having a gut-wrenching interaction. Presenting this methodology, we distinguish it into three stages: I. “*Disclosure of the problems of the Earth and the heart*”, which consists in updating the problem of preserving the Earth in relation to the issues of cardiological health and human phenomenology in general; II. “*Earth Loss Modeling*” which is to simulate a temporary “break” with the Earth; III. “*The Earth’s Epistrophe*” (“*Eternal Return to Earth*”) is the stage that is to form a model of “return” to Earth. At this stage, it is suggested to imagine a process of return to Earth, which includes, above all, the “discovery” and comprehension of the planet as a living being and as part of itself. The leading role in carrying out this technique belongs to the teacher, who acts mainly as a trainer using elements of psychocorrection and psychotherapy in his activity. Accordingly, when carrying out this technique, it is necessary to take into account the psychological state of the persons involved.

To analyze the psychological and educational effects of this exercise, we used the questionnaire formed by us “Epistrophe of the Earth”. The questioning was conducted before the specified procedure and after.

*Questionnaire of Fedorets-Klochko “Epistrophe of the Earth”*:

1. Is it easy to remember the best places you have been in your life?
2. Do you like to admire the landscapes for a long time and to remember and discuss them?
3. Do you associate your own cardiac health problems with pollution and destruction of terrestrial landscapes, forests, seas, rivers, animals (living creatures)?
4. Do you associate cardiac health problems with pollution and destruction of terrestrial landscapes, forests, seas, rivers, animals?

5. Is there any connection between the deaths of humans due to cardiac pathology and the destruction of terrestrial landscapes, forests, seas, rivers, animals?
6. Can you influence the process of conservation of the Earth and its landscapes and thus save the “Face of the Earth”?
7. Is planet Earth at least a metaphorically living being who sees, understands, and feels its destruction?
8. Do you feel in yourself and in your heart “part” of the “soul” of planet Earth?
9. Have you ever considered what the Earth will be like for your children and great-grandchildren?
10. Has your attitude towards the planet Earth and its “Face” (landscapes), rivers, seas, forests changed after an imaginary trip to “Nowhere” or “Nothing”?

The answer is formed by indicating “Yes” (+) or “No” (–). We do not recommend this method with people who are psychologically unbalanced, sick and very tired. The methodology includes the demonstration of paintings and photographs of terrestrial landscapes, both preserved and destroyed in an amount of at least 20–30.

The statistical significance of the differences found in the survey results conducted among Physical Education teachers before and after the implementation of the “Epistrophe of the Earth” proprietary methodology was determined with the help of McNemar’s test [48], which is also called the sign test. It allows to determine the general vector of the studied feature, i.e. it may be applied in the case when changes may be assessed only qualitatively, e.g. the change in of the negative attitude towards something into positive.

Let us mark the number of prevailing (typical) shifts as  $G_{typ}$ , the number of shifts in the opposite direction (atypical) as  $G_{atyp}$ . The number of cases, when there was no shift (the answer did not change) will be marked as  $G_{zer}$ . In McNemar’s test, the shifts in which the value of the feature did not change  $G_{zer}$  are excluded from consideration.

In this case the number of pairs of  $G_{zer}$  answers, in which the value of the feature did not change, are excluded from the consideration and only the number of pairs  $n=G_{typ}+G_{atyp}$  is considered. The smaller the value of  $G_{atyp}$  is, the more probable it is that the shift in the typical direction is statistically viable.

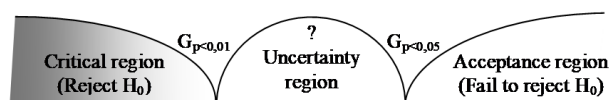
In this case, two hypotheses are formulated:

$H_0$  – The prevalence of the typical vector of the shift is accidental;

$H_1$  – The prevalence of the typical vector of the shift is not accidental;

Using the statistical tables of the sign test we compute the value of G sign test for the levels of statistical significance at  $p < 0.05$  and  $p < 0.01$  [49]. The prevalence of a typical shift is valid, if the empiric value is  $G_{atyp} \leq G_{p<0.05}$  and even more valid if  $G_{atyp} \leq G_{p<0.01}$  [49] (figure 1).





**Figure 1.** The Acceptance region, Critical region (Rejection region) and Uncertainty region for the McNemar's test

### 3 Results and discussion

*The concept of “Tellus-Anthropic Convergence” as a methodological intention of greening.* For the development of new and for the greening of existing bodily anthropopractices and health-saving [50] and physical and recreational technologies used in Physical Education classes and in general in education, we apply a system of Hellenistic concepts that reflects the ecophilicity, humanistic nature and human nature. The same concepts are an ecologically oriented component of the conceptual and methodological framework for improving the health-saving competence of Physical Education teachers. The nature of man is revealed to us in the “spirit” of the harmonization of relations in the system of “man – Earth”. Our pedagogical system conducts an ethical and value-oriented update of the phenomenology of the Earth and the idea of its preservation, which is presented as a leading idea of the trend of sustainable development. As a system-organizing idea and value guideline, we use A. Gore's concept of “Caring for the Earth” [25]. A. Gore's idea is related to the value-meanings of the phenomena of anxiety, “caring for oneself”, “caring for others” and thus can be organically incorporated into cultural and educational “practices of oneself”. These phenomena of concern are also the defining and leading personal and behavioral qualities in the personality-existential component of the health-saving competence of a Physical Education teacher.

In this way, the idea of sustainable development and the direction of health in our methodology are interrelated, integrative, cross-cutting, systematic and defining. Accordingly, the issues of health conservation and the ideology of sustainable development underlie the transformation of methodological and technological concepts in the direction of reflecting in them the relative and interdependent preservation of both human health and the Earth. This methodological technique, as a result of which the meanings and values of preserving planet Earth are introduced into the health-saving competence of the Physical Education teacher, as well as into the health-saving and physical-health technologies, and also called the problem of its existential “dialogue” with human call “Tellus-Anthropic Convergence”. This convergence is one of the anthropologically and existentially oriented options for greening. For clarification, we recall that Tellus (lat. *Tellus*) was the Roman goddess of Mother Earth.

The ethical and practical meaning of the “Tellus-Anthropic Convergence” is the formation, or rather the restoration and maintenance of “subtle”, harmonious, proportionate, compassionate and “friendly” interactions between man and planet Earth. The conceptual feature of the “Tellus-Anthropic Convergence” as a humanistic and ex-

istentially oriented methodological concept of greening is the integrative use of the ideas of existential and dialogic philosophy, care, ontologization, axiologization, psychologization, as well as ideas about planet Earth as a living being [6, 19] and an integral part of human existence. That is, the Earth is regarded primarily axiologically as a vital and personal value, ontologically as a special being and a spiritual or transcendental essence, as well as the Earth-Mother, and not only so much as a resource. The importance of the development of pedagogy with the use of transcendental meanings that can be formed as a result of the use of the potential of the ancient Greek cultural and educational system of the paideia, says Pavlos E. Michaelides [9].

Thanks to this methodological way, we actualize existential, vital, value, transcendental for the individual formats of understanding and relation to the planet Earth. Accordingly, existentially oriented aspects are contextually and in an up-to-date form incorporated into competence, in corporeal anthropopractices and in health fitness and wellness technologies. This is implemented through both the methodology and technology and practice levels.

Ecophilically interpreted Hellenistic concepts are used in several formats, namely:

- 1) the actual component of the conceptual and methodological foundations of this pedagogical system;
- 2) criteria and decisive ideas on the basis of which improvement of health-saving competence, as well as health-saving and physical health technologies are carried out;
- 3) the conceptual basis for the formation of questions, questionnaires, educational discourses and narratives, with gothic practices.

Competent measurement of methodological valuable reflections of ecophilicity and humanism of Hellenistic culture. In the aspect of an optimistic, innovative [51, 52] and competently oriented [17] understanding of the current environmental crisis [1, 2], which threatens the planet Earth, it is relevant to take into account the historical experience of ancient Greece “concentrated” in the potential of the paideia (ancient Greek *παιδεία*) [8, 13, 14, 22, 23] and Hellenistic concepts [4, 9, 13, 14, 33, 34, 40–47]. Hellenistic culture solved the problem of resources' scarcity not only by colonizing new lands [26] but above all by unlocking the potential of man and society. That is, by moving not only “outside” into the World, but “inside” the Person, into his essence and his knowledge. This was one of the main and defining anthropologically oriented innovations of Hellenism.

An important methodological message is that Hellenism, which is at the foundation of modern rationality, science, freedom, democracy and technological power of Western civilization and humanity, has formed its humanistic concepts practically and anthropologically oriented, namely, as “technology of oneself” [33, 34, 38] or anthropopractices including corporal practices. The value of these Hellenistic concepts and the anthropopractices that underlie them lies in their focus on unlocking human potential

by harmonizing it with the surrounding world, with Gaia (Earth). That is, we point out that these Hellenistic concepts were originally formed as ecophilic.

To some extent, the emergence of the cultural phenomenon of Ancient Greece can also be seen as a historical example of the effective use of the crisis by a perceived and “interpreted” Hellenistic culture as a stimulus to development. In this context, it can be noted that in accordance with the concept of “Call-and-Answer”, A. Toynbee [26] Hellenistic culture has formed an effective response to environmental challenges [26]. And this answer was first and foremost aimed at transforming the human being in the direction of discovering his human principle, potentials of intelligence and heart, harmonization and preservation of the Earth. The answer was, in its essence, eco-friendly, humanistic, and existential.

*Integrative use of Hellenistic concepts and ideas of sustainable development to improve the methodology of health-saving competence and health-saving and health-improving technologies.*

Now, before humanity, the challenges are much more complex than in the Hellenistic era. Therefore, we are talking about the need for methodological and ecological-value reflection of Hellenistic concepts [4, 9, 13, 14, 33, 34, 40–47] with their appropriate use. These concepts are at the heart of this methodological system. Accordingly, we apply them to improve the methodology for developing the health-saving competence of Physical Education teachers. These concepts are also used for the selection, development and greening of health and fitness technologies aimed at the formation of “Sustainable Development Person” and the relative preservation of his health. Let us now consider the Hellenistic concept system, which consists of: agate, arete, hybrus (in the sense of counteracting hybrus), observance throughout, equilibrium of forces, harmony, epistrophe, sophrosyne, self-care. These concepts are revealed by us in the spirit of “Tellus-Anthropic Convergence” and “Care for the Earth” [25] and are accordingly aimed at the integrative and interdependent preservation of the planet Earth and human health.

As we actualize the existential and educational aspects of the Sustainable Development Person’s evolution and construct of health, we formulate the concept of “Good Human-Earth Dialogue”. This concept is a refinement and further development of the idea of the Tellus-Anthropic Convergence that we have formed above. At the heart of this development are M. Buber’s idea that dialogue is the primary ontological (existential) structure [21] and the concept of “the Other” by E. Levinas [27] where “the Other Personality”, which in this case represents the Earth, is a compulsory not only for meaningful and value development, but also for existence in general. Significant aspects of our concept are the ideas of “Caring for the Earth” by A. Gore [25], “Gays” by J. Lovelock [6], the geopsychology of A. Mindel [19], the existential approaches of L. Binswager [10], the Hellenistic phenomenon of sophrosyne (ancient Greek *σωφροσύνη*) and cordocentric traditions of Ukrainian culture. By using the above system of approaches, an ecophilic and value image

of the Earth is created. At the same time, on the basis of the hermeneutical approach, metaphorization, existentialization, axiologicalization, personification of the Earth are carried out. Accordingly, the Earth is seen as a living being that has a heart and soul or “at least” as a special high value and meaning. In this context, the metaphor of the heart is a relevant aspect of axiologicalization, sacralization, psychologization and existentialization of Human-Earth dialogue and understanding of this interaction as a common good for man and the planet.

As an example, let us note that the well-known technological ways that make it possible to reveal the “Benefits of dialogue between man and Earth” are: learning the ability to admire terrestrial landscapes, objects, elements; the formation of the ability to sense and “understand” the earthly elements (fire, tree, water) and phenomena (animals, plants) through the use of bodily and motor metaphors of “Merging” with them or “Reincarnation” in them. Actual is the use of bodily and motor metaphors in dynamics, in motion. At the same time, the teacher must use the potential of landscape, theater, existential [20] and popular pedagogics in the development and implementation of health and fitness and wellness technologies.

*Αγαθου* (ancient Greek) - good (agate) [13, 40, 43], is one of the central Hellenistic concepts. In the context of the ideology of sustainable development, we interpret *αγαθου* as the need to bring and “redistribute” good for both the individual and the “Other” (E. Levinas’s concept of “the Other”) [27] and for the planet Earth. This approach is somewhat contrary to the existing ideology of Homo Economicus [9] aimed at achieving good in the short term and only for themselves and their loved ones. The concept of sustainable development reveals to humanity as a significant “other” “person” after and “close to” man – the Earth. Accordingly, *αγαθου* for the Earth becomes an integral and essentially primary, archetypal and sacred dimension of human good, life, well-being and health. That is, the existence of a preserved Earth and the actions, meanings, values and intentions that are aimed at it are considered as high – “the Good of the Earth” [39].

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*Αρετη* (ancient Greek) – arete or virtues (virtue, perfection, excellence, high quality, nobility) is one of the systematic Hellenistic concepts [9, 13], (Dialogue of Plato “Menon”) [42]. In the context of the health-saving issues of physical culture and sport, the Hellenistic concept of bodily arena [16], among which health, strength, beauty, is important. As in the past, we are updating the need to focus health care competences and fitness technologies on the arete, including the physical. At the same time, into the dimensions of arete it is suggested to bring connotations of the meanings of the Earth’s preservation.

We consider the health-saving competence of a Physical Education teacher as a high level of training to be a “professional arete”. In the era of postmodern competence [53] and professionalism have essentially become system-organizing sociocultural factors or “major” aretes forcing others out. According to the “competence” “transformations” [20], the connection of bodily aretes with the image of the person, the existential dimension, with social adaptation, inclusion in society and profession, as well as with personal development, actualization and self-realization is relevant.

In the previous industrial era, physical training was directed to the formation of certain qualities (mainly strength, endurance) as isolated functions that could be used for war and production. Let’s mention the Soviet functionally oriented system of TRP (“Ready for work and defense”). Reducing in essence and functionally oriented “models” of man in the modern era speaks L. Marcelle [54]. It is clear that such a “military-industrial” approach ignored the problem of ecophilicity, existential and psychological health, and diminished the possibilities of choice, etc.

Now, given the ecocentric and human-centered tendencies and methodological potential of the ideas of “Revolutionary Humanism” (A. Peccei) [2], one can say that the development of physical qualities of a person that collectively participate in the formation of not only force or en-

durance, but above all beauty, health, image, intelligence, professional and social and environmental adaptation, and bring joy and happiness to man. Beauty, health, life, happiness are existential values in the understanding of which a person consciously or unconsciously incorporates into his existence a relevant “background” – the Earth. Therefore, the actualization of the existential dimension [10, 18] both in health-saving competence and in the implementation of physical and fitness technologies is a way of “returning” a person not only to himself but also to planet Earth. In this case, the Earth should become a “living space” and a part of life “being included” in the existential space, rather than being a “neutral” environment.

Using the idea of sustainable development and “the Earth Charter” [39], we formulate the concept of “Earth’s Arete” (“Earth’s Virtue”), to which we refer: “Care for the Earth [25]; love for the Earth; the ability to admire the landscapes of the Earth and its “things”, plants, animals; responsibility for the Earth; respect for the Earth; fear of possible Earth damage and other ecophilic qualities, installations and intentions. The concept of “Earth’s Arete” reflects the high virtue of a person who manifests himself in a responsible, caring, kind and warm attitude towards the Earth. This concept is different from the Platonic idea of “Earth’s Arete” [55], which reveals the quality of the Earth itself. Thus, the improvement of the health-saving competence of the Physical Education teacher should be carried out with the actualization of the idea of “Earth’s Arete”, the use of which in physical culture-improving technologies is existentially oriented through greening.

In confirmation of the relevance of our existentially and environmentally oriented “arete approach”, we refer to the direction of psychotherapy – arete-therapy, which was developed in 1917 by the Russian physician I. Yarotsky [56]. This method consisted in updating the arete primarily of an altruistic character for therapeutic purposes. To preserve the Earth, the manifestation of altruism will be “the Earth’s Arete”, which can provide a person with the stability of his health and life.

*Hubris counteraction.* Hubris (ancient Greek *υβρις*) – pride (boldness, excessive vanity) is one of the current Hellenistic concepts [42, 46]. The ancient Greek goddess Hubris could lead a person to the vicissitudes (ancient Greek *περιπετεια*) of the essence of which is the destruction of available opportunities, resources and the disappearance of luck. The next stage was nemesis (ancient Greek *νεμεσις*) – divine revenge, destruction and death. Therefore, “immersion” in the deep essence of this concept opens the way to self-improvement and the formation of optimal life strategies by avoiding the hubris and “purifying” from it.

Nowadays, as in the ancient era, the restriction of a hubris is relevant because it is often the basis of the overstated requirements and needs of humans and their incorrect or “hubris” behavior. Hubris result in excessive resources, which must be taken into account when implementing the concept of sustainable development. In physical culture and sports, hubris are often the result of illness or even death. This happens when a person wants to demonstrate to himself or someone “special” physi-

cal and motor abilities and athletic performance without considering the level of fitness and health and neglecting common sense, expediency, life meaning and values. An example of hubris in education is the pathos-infused “Day of Health”, which sometimes ends in illness or even the death of its participants. This is due to the fact that people who do not have the appropriate level of training demonstrate “special” sport results. Another example is the active use of anabolic drugs in bodybuilding in order to rapidly “build up” muscle volume.

Therefore, there must be a limit and a measure of agonizing and demonstrative physical culture, which can be transformed into a continuous competition, struggle and race. In our opinion, hubris is one of the causes of children’s death from sudden cardiac attack [57] at Physical Education lessons and youth sports. Physical Education teacher needs to develop such professional settings and a health-friendly environment where the hubris is minimized. This will eliminate the achievement of a training or competitive result at the cost of disrupting the health or life of the students. It is also important to minimize the “hubris” in its essence of the assessment of the work of a Physical Education teacher, namely by the performance of his students at competitions or other events.

The hubris is one of the socio-political, psychological and cultural factors for the destruction of the Earth. Therefore, knowledge of it and its limitation in the profession of Physical Education teacher promotes the concept of sustainable development and preservation of health. Hubris can be minimized by displacing them through the formation of “Earth’s Arete” in children, sophrosyne (ancient Greek *σωφροσύνη* – moderation, prudence), modesty, and through the development of a tolerant and compassionate attitude toward one another.

*Συμμετρον, μετρον* (ancient Greek) – *being moderate in everything* [27], is an important concept that reflects the proportionality of the nature of man and the world around him. Plato considers the problem of measure in the dialogues “The Philebus” [43], and “The Phædo” [42]. In ancient Greeks, the Goddess Nemesis was a symbol of measure. It is interesting that Nemesis was also the Goddess of revenge, which came when a man neglected the measure. This is what we see in our world. The Nemesis of the Earth “creates” revenge for humankind for its destruction, which manifests itself in the form of environmental and climatic problems and disasters.

The measure was an ethical, aesthetic, space-ontological notion of Hellenistic philosophy, culture, *paideia* (ancient Greek *παιδεία*) [13], gymnastics and medicine. The measure was a methodological, ideological and spiritual basis for understanding and updating the phenomena of moderation, proportionality, proportion, symmetry, boundaries, harmony, cosmic order, good, arete, beauty, ethics, aesthetics.

Specifying that the Hellenistic understanding of the measure was quite varied and included *meros* (“measure”) (“Timaeus dialogue”), *metrios* (“moderation”, “moderate”) (“State”), *emmetros* (“measured”), *symmetria* (“commensurate”) (“The Philebus dialogue”) [43], *mesos* (“middle”, “center”), *mesotes* (“center”, “centrality”). The

idea of the measure permeated the life of the ancient Greek policy by effectively competing with the intensities of expansive growth, accumulation and expansion inherent in modern consumer civilization. A. Peccei [2] and D. Meadows [7] reveal to mankind in all intellectual power and noumenal grandeur the conceptual and ecophilic potentials of the phenomenon of the boundaries, in which the idea of the measure of human influence on Earth is represented.

The implementation of physical anthropopractics and health and wellness technologies, as well as the improvement of health-saving competence, must take into account the grand idea of *Μετροιον* (measures). This is relevant because even in a professional environment, there is an idea of the need for “constant movement activity” without sufficient consideration of the phenomenology of the organism and life. At the heart of this nihilistic “idea” is the setting of neglect and a “professional hybris”. Lack of measure and moderation in the training process is a way that increases the risk of acute cardiac pathology.

In accordance with the concept of embodied rationality by J. Lakoff, the basis of our cognitive activity are physical phenomena [30]. Based on the conceptual potential and corporeal orientation of “corporeal rationality” [30], embodied cognitive science [31, 32], autopoiesis [28], enactivism [29] can be said that physical culture is one of the defining disciplines that contributes to the development of the ability to comply with the measure. This is due to the fact that within the stated directions the observance of the measure is formed through the body, bodily and motor experiences, practices, reflections, metaphors, scenarios. The understanding of the measure develops through bodily anthropopractics, health and physical and fitness technologies through the interactivity of locomotor sensations, through the development of motor intelligence and reflection, which is a precondition for a person to understand his boundaries and opportunities.

In order to teach the measure, it is important to reveal to the students the phenomenology of the Earth as systemic and interdependent with human integrity. In this aspect, care of the forest, garden, lawn, and pets is also relevant, so that care and measure are formed. In line with these ideas, we present an environmentally-friendly concept of “*Complying with the Measure in Active Impact on Earth*”. The purpose of this concept is to develop in children the attitude and skills of observing the measure as a special “Arete of the Earth” and understanding the inadmissibility of crossing borders in active (economic and other) influences on the Earth.

*Ισονομη* (ancient Greek) – *the equilibrium of forces* [13, 31] is a relevant Hellenistic concept that reveals the deep essence of both human health and the well-being of the Earth. A modern physiological and biochemical concept that is formed on the basis of the idea of equilibrium of forces is homeostasis. In the context of our problematic, the actualization of the idea of equilibrium of forces in the system “man – Earth” is revealed in the concept of sustainable development.

*Αρμονια* (ancient Greek) – *harmony* (lat. *harmonia*) is one of the main and defining Hellenistic concepts. In



the Greek pantheon, the goddess Harmony was the daughter of Ares (god of war) and Aphrodite. It embodied the idea of family harmony and represented the personalized essence of the combination of opposites. In addition to proportionality, harmony is about consolidation, beauty, invisibility. Plato in the dialogues “Timaeus” [43], “Phædo” [42], “Philebus” [43], “Banquet” (“Symposium” (Συμποσιον) [42], “State” [43], revealed harmony as a manifestation of the high, immortal, divine in man, and also illuminated its cosmic-ontological dimension in the form of “harmony of spheres” (ancient Greek *αρμονια εν κοσμω, η του παντος αρμονια*; lat. *harmonia mundi*).

The formation of harmony in the person, namely between his physical and mental and spiritual dimensions, is relevant. Therefore, one of the central health aspects is the question of harmonious relations in the “pairs” of phenomena, namely between: bodily and intellectual, bodily and spiritual, man and Earth. Formation of harmony in man himself is a precondition for the harmonization of his relations with the Earth. At the same time, a harmonious relationship between man and Earth is a condition for actualization, personal growth and peace of mind.

In this aspect it is necessary to take into account that disturbance of harmony between physical and spiritual and mental, leads to neuroticism and psychopathization (persistent maladaptive and disharmonious changes in character) of the person. There is such a pathology of character as somatonia [58], which may arise due to the excessive concentration of the human body. Somatonia can be seen as a manifestation of hybris when the physical arete (health, beauty, strength) begins to dominate the spiritual and mental being – intellect, ethics, etc. Sometimes somatonia is found in athletes and sportsmen. Physical education and sport should be used in a proportionate manner to human nature and promote the harmonization of the individual. Therefore, when organizing motor activity, it is necessary to take into account the risks of unpredictable “somatonia”, “hubris” “effect”. The essence of it is a violation of human harmony. In this case, the person may become rude, arrogant, aggressive, primitive, prone to chemical dependencies. The reason for this would be an over-enthusiasm for physical culture or sports that is not balanced by spiritual and intellectual being and perfection.

Adapting the idea of harmony to our methodological system, we formulate the concept of “Tellus-Anthrop Harmonization”, the meaning of which is the use of health-saving competence and physical and fitness technologies for the improvement of man and for his personal growth in a relative and “inseparable” way, while preserving formation of this harmony in the system “Man–Earth”. Within this concept, the preserving competence of a Physical Education teacher is regarded as a personal and professional instrument of harmonization of the same person, formed on the basis of ecophilic and terracentric intentions and values. An example of such harmonization is a walk in a park or forest when the Earth, through interaction with man, “reveals” in him the best sides of the soul. It is valuable to take a walk or a rhythmic run, which helps to create the effect of self-knowledge correlated with the disclosure

of the beauty and “soul” of the landscape and the “heart” of the Earth.

*Epistrophe* (lat.) – *the epistrophe* represents the Hellenistic idea, the essence of which is eternal return [44]. Epistrophe in our interpretation is a topical ecophilic concept, which aims at understanding man himself and his being in the form of a constant or cyclic return to himself and to the Earth as a planet and place of life, as well as “finding” himself as an “ideal” and healthy person. That is, a return to Earth as in the Garden of Eden. The epistrophe idea is contextually embedded in spiritual anthropopractices, including prayer, yoga. In the epistrophe, there are meanings of renewal, improvement, transformation, revival of the individual through his return to the “ideal state”. In this case, such an ideal is to unveil the grandeur, beauty, vitality, value and being of the Earth. So, a person needs to constantly work to return the “paradise” Earth that it was before the industrialization era. To return such Earth to the very person *primo loco* (primarily) one must return to oneself by becoming an ecophilic “Sustainable Development Person” and not remain an “industrial-agricultural predator”.

We actualize the idea of an epistrophe, which is interpreted as the need for a “permanent and eternal” return of the planet Earth in its primordial beauty, paradise beauty, power, vitality and diversity. Accordingly, relevant is the “eternal return” of man to himself and “finding” himself, his integrity, identity, mind, physicality, capabilities, power through interaction and dialogue with the Earth and on the saved planet.

The constant orientation of a person to save and prosper the Earth both in the present and in the distant future, as well as the ability to understand and prevent the problems of the planet as our own, we consider in the format of the concept “Earth Epistrophe” (“Eternal return to Earth”). This concept includes in its composition the ability to existentially-value understanding of the Earth and to understand it as a special being and a constant life purpose to which high human intentions, dreams and actions are directed. Earth’s epistrophe as a complex and “global” feeling is well understood by astronauts and humans who have nostalgia for their homeland. That is why expatriates who are nostalgic are “forever returning” to their homeland in dreams and in the desire to at least help their land. We consider patriotism a form (or a particular case) of the manifestation of the “Earth’s Epistrophe” which is inherent in the nature of man, both terrestrial and cosmic.

*Σωφροσυνη* (ancient Greek) – *sophrosyne* is a significant Hellenistic concept. The *sophrosyne* reflects the phenomenology of a prudent, harmonious and moderate character and a developed life-giving intelligence that defines a socially and environmentally acceptable style of behavior and harmonizes one’s own life. The phenomenon of *sophrosyne* is revealed by Plato in his work “The State” [43], and in the dialogues “Charmides” [41] and “Alcibiades I” [41]. *Sophrosyne* is a complex integrative character, spiritual and mental quality, which is a system formed by many components. The composition of *Sophrosyne* includes: moderation, common sense, prudence, restraint, harmony, ethical orientation. *Sophrosyne* also contains

skills of reflection, self-discovery, social communication, foresight, planning, order and consistency, as well as the ability to maintain health and the ability to master the arts and technological skills.

We consider *sophrosyne* as a defining, integrating and central phenomenon of the character, behavior and mental sphere of the “Sustainable Development Person”, because this quality has the potential of moderation, harmony, measure and understanding of its limits of influence. Contextually *sophrosyne* is an ecophilic quality, because a harmonious and moderate person is not inherently a destroyer of either the environment or himself. In the Ukrainian tradition, *sophrosyne* was a moderate, balanced, compassionate and kind person [24]. Moderation and prudence in the Ukrainian tradition as well as in the Hellenistic were valued more than special intelligence, beauty or other arete. Thus the *sophrosyne* reflects the harmonious and high in nature of man (ancient Greek *φύσις του ανθρώπου*) and the idea of its sustainable existence, as well as the ability to live peacefully with others, with the environment, with the Earth, and the ability to preserve oneself, their own authenticity and personality.

Presence of a formed *sophrosyne* in a Physical Education teacher minimizes the risks of using excessive, disarming and incorrect physical activities in the educational process, and also limits the creation of total competition and race. This, in turn, is a pedagogical condition for the prevention of sudden cardiac death and other acute cardiac pathology. *Sophrosyne* is essentially a manifestation of “sustainability and harmony of personality”, which is a precondition for optimal, non-expansive, peaceful, health-saving and “economical” and low-cost interaction with the environment.

Sustainability, harmony, balance and moderation as components of *sophrosyne* are correlated with the trend and ideology of sustainable development. Metaphorically speaking, one can say that sustainable development is the “*sophrosyne* of humanity”. That is, the conservation of the Earth requires the formation of *sophrosyne* both on the personal and metasystem ethnic, political, social, managerial and terrestrial levels. In our view, the development of *sophrosyne* will contribute to the formation of a unified terracentric and “ecophilic world” through actualization of tolerance, moderation, harmony, discretion, peacefulness, effective intercultural communication and preservation of health. We actualize the eco-oriented issue of the need for the development of *sophrosyne* as a defining component of the personal-existential component of the health-saving competence of a Physical Education teacher [24]. Accordingly, the development of *sophrosyne* in students through the use of health-saving and physical-fitness technologies is relevant.

*Epimelēsthai sautou* – “*taking care of oneself*” is a culturally significant Hellenistic concept and “technology of self” (according to M. Foucault) [33, 34], which included taking care of the body, soul, family, students, and the Delphic principle “extended” to the anthropopractices of self-knowledge (*gnothi sautou*). *Epimelēsthai sautou* is covered by Plato in his dialogues “Alcibiades I” [41] in “The Apology of Socrates” [41]. The anthropological

value and life value of the *epimelēsthai sautou* for contemporaries was revealed by M. Foucault [33, 34]. Caring for oneself was a central anthropopractices in Hellenistic culture. Ideas and traditions close to “taking care of yourself” exist in other cultures. The Ukrainian culture has a tradition of “handling himself”. It is, in its essence, some analogue of the Hellenistic *epimelēsthai sautou*.

In accordance with the ecocentric meanings of the concept of sustainable development, we are updating the question of the need to use the Hellenistic concept of *epimelēsthai sautou* in a modern interpretation with the inclusion of A. Gore [25] and “Tellus-Anthropoc Convergence” ideas in his semantic sense. The ecophilic significance of the *epimelēsthai sautou* is that due to this anthropopractices, the responsibility of the individual and his ability to reasonably and moderately (in the “*sophrosyne*” spirit) take into account the Earth’s resources and their own potential. *Epimelēsthai sautou* in combination with “Care for the Earth” [25] is an ecophilic way of integrating and putting into practice the concepts and phenomena presented above.

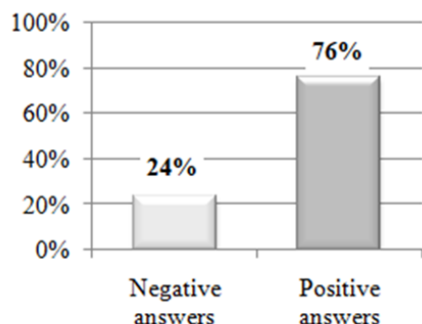
In concluding the Hellenistic concepts used in this methodology, we pay attention to their spiritual and transcendental dimensions and balancing and harmonizing character, as well as to the inexhaustible intellectual-value, hermeneutic and existential potentials, and deep wisdom, eccentricity, ecophilicity. This makes these Hellenistic concepts and anthropopractices and technologies formed on their basis effective instruments of ecophilic and humanistically directed realization of the idea of sustainable development, ways of subjectivity and development of professional subjectivity and health-saving competence of the teacher of Physical Education, as well as conceptually methodological health conditions.

Testing of the method of “*Epistrophe of the Earth*”. For the purpose of forming a value relationship to the Earth and for the development of the Earth’s Arete (Earth Virtue), the Concern for the Earth, and for promoting the processes of forming a unified world, we conducted research using the Earth *Epistrophe* (described above in section methods). A significant aspect of this technique is the attempt to form or more accurately expose “the Existential of the Earth” in Physical Education teachers. We consider the development of a valuable attitude to the planet Earth and the formation of the “*Arete of the Earth*” as an actual component of psychological health.

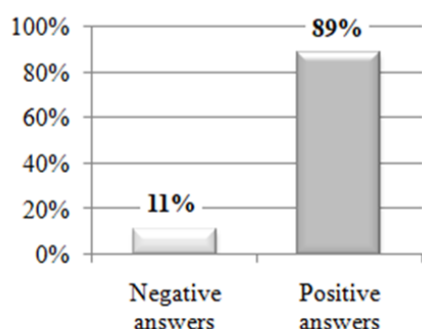
The study involved 157 Physical Education teachers who have received advanced training. The research was conducted in 2017-2018 at the Drohobych Ivan Franko State Pedagogical University (Institute of Postgraduate Education), Chernihiv Regional Institute of Postgraduate Pedagogical Education named after K. D. Ushynsky, Sumy Regional Institute of Postgraduate Pedagogical Education, Mykolaiv Regional Institute of Postgraduate Pedagogical Education.

When interviewed for “the *Epistrophe Earth*” method, the number of positive and negative answers was 76% and 24%, accordingly (figure 2).

After conducting “the *Epistrophe Earth*” method, the result of the questionnaire determined the change in the



**Figure 2.** The results of the questionnaire of Physical Education teachers in order to determine the value relationship to the planet Earth carried out before the method of “Earth Epistrophe”



**Figure 3.** The results of the questionnaire of Physical Education teachers in order to determine the value relationship to the planet Earth was carried out after carrying out the method of “the Earth Epistrophe”

specified proportion – an increase in positive answers, accordingly 89% and 11% (figure 3).

As it is seen from figure 2 and figure 3, after the application of the methodology of development of a value-based attitude towards the Planet Earth and the formation of the “Arete of the Earth”, the number of positive students’ answers in the questionnaires increased. Using the McNemar’s test, lets us prove that this positive shift is prevailing [48].

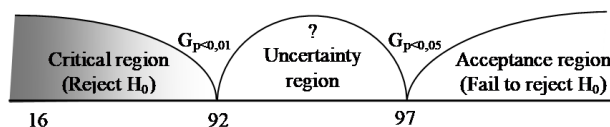
According to the received survey results, the number of prevailing (typical) shifts was  $G_{typ} = 220$ , the number of shifts in the opposite direction (atypical) was  $G_{atyp}=16$ . The sum of positive and negative shifts is  $n = G_{typ} + G_{atyp} = 220 + 16 = 236$ .

Let’s formulate the hypotheses.

$H_0$  – the shift in the direction of a positive attitude towards the Earth and the formation of the “Arete of the Earth” is accidental;

$H_1$  – the shift in the direction of a positive attitude towards the Earth and the formation of the “Arete of the Earth” is not accidental.

Using the tables, we determine the critical value of the  $G$  sign test [49]. This table indicates critical values of the sign test for  $n = 220$  and  $n = 240$ . We select the value



**Figure 4.** The Significance region (Critical region) for the McNemar’s test, the shift in the direction of a more positive attitude towards the Earth and the formation of the “Arete of the Earth” is not accidental

of the sign test  $G_{p<0.05}$  and  $G_{p<0.01}$   $n = 220$ , as they are more severe than those for  $n = 240$ . Thus, for  $n = 220$   $G_{p<0.05}=97$  and  $G_{p<0.01} = 92$ . These are the maximum numbers atypical shifts under which the shift in the direction of a more positive attitude towards the Earth and the formation of the “Arete of the Earth” is not accidental and may be considered viable.

In our case,  $G_{atyp} \leq G_{p<0.01}$  as  $16 \leq 92$  (figure 4). The  $H_0$  is declined. The  $H_1$  hypotheses is accepted. According to it, the shift in the direction of a more positive attitude towards the Earth and the formation of the “Arete of the Earth” is not accidental. Thus, the statistical significance of the differences determined by the survey results conducted among Physical Education teachers before and after the implementation of the “Epistrophe of the Earth” propriety methodology in order to determine the level of formation of a value-based attitude towards Planet Earth and the formation of the “Arete of the Earth” is significant and viable.

## 4 Conclusion

In this study, through the ecologically and terracentrically oriented interpretation of Hellenistic concepts, the innovative, methodological and humanistic potential of the concept of sustainable development is revealed. The Hellenistic concepts fully reflect the ecophilic, humanistic and intellectual essence of a person, which determines their methodological and practical value and expediency of use in modern pedagogical systems. The idea of sustainable development revealed through ecophilic interpretation of Hellenistic concepts is presented as a conceptual and methodological basis for improving the health-saving competence of Physical Education teachers in postgraduate education. Accordingly, the concept of sustainable development is also highlighted as a significant methodologically valuable condition for the greening of health and fitness technologies.

On the basis of ecologically valuable reflection of the ideology of sustainable development, “the Earth Charter”, noospheric and geopsychological doctrines and Hellenistic ideas, we develop methodological concepts of “Tellus-Anthropic Convergence”, “Good of the Dialogue of Man and Earth”, “Arete of Earth”, “Compliance with Active Impact on Earth”, “Tellus Anthropic Harmonization”, “Earth Epistrophe”. These concepts can be used by the Physical Education teacher at both the methodology level in the design of training classes and programs, as well as in educational health and wellness technologies

and practices. The system-organizing concept of Tellus-Anthropic Convergence is presented as an existential value and health-oriented version of greening. The essence of this concept is the idea of convergence, rapprochement, as well as the restoration and preservation of the existential dialogue of man and the Earth, which is represented as: the basis of being, life meaning and existential value. This concept discloses an innovative and existentially-dialogically oriented interpretation of the idea of sustainable development and the global and life-giving meanings of “the Earth Charter”.

In order to form a value relation to the Earth, to develop the “Arete of the Earth” and to unveil the “Existential of the Earth”, we used the value-oriented reflexive technique of the “Epistrophe of the Earth”. Based on the analysis of the conducted questionnaire, we can draw the following conclusions:

- 1) the problem of Earth conservation and sustainable development is relevant among Physical Education teachers; the Earth Epistrophe technique promotes the spreading of Earth conservation values and their transformation into personally meaningful ones for the teacher;
- 2) the method of “Epistrophe of the Earth” with its further improvement and testing can be used to form a valuable attitude to the Earth, actualization of environmental issues, formation of psychological health of participants in the educational process and actualization of the concept of sustainable development.

According to the survey results and conclusions regarding the statistical significance of the differences between these results determined with the help of McNemar’s test, a conclusion may be drawn regarding the efficiency of the “Epistrophe of the Earth” propriety methodology, implemented with the aim of forming the health preserving competence of a Physical Education teacher. This conclusion is based on the fact that  $G_{atyp} \leq G_{p<0.01}$ , as  $16 \leq 92$ . Thus, the empiric value of  $G_{atyp}=16$  is in the insignificance zone as it is considerably lower than the table value of  $G_{p<0.01}=92$ , which indicates a high level of probability that the differences in the received results are viable and not accidental.

On the basis of ecological value and mystical reflection of the problem of Earth conservation, the question of determining the ecophilic ways of human development of the future – “Sustainable Development Person” is actualized. In addition to ecocentric intentions, values and attitudes, sophrosyne is the leading personality-behavioral and mental quality of Sustainable Development. The Hellenistic concept of sophrosyne is a complex harmonized system of personal and mental qualities integrated on the basis of moderation and harmony. Among the components of sophrosyne, ecophilic and important for maintaining health are such personality and behavioral qualities as: moderation, common sense, prudence, harmony, restraint, sense of self-care, self-knowledge, caution, self-restraint, etc. To save the planet it can be moderate and harmonious man, who with the Earth and with himself exists in har-

mony, and is accordingly restrained in expansive and destructive desires, plans and actions.

Metaphorically, we regard the concept of sustainable development as the “sophrosyne of humanity”, as the ecophilic cultural code of the global world, and as a noospheric self-preserving intention. Sophrosyne can also be considered the personal and psychological basis of a harmonious, life-giving and sustainable existence of man. Accordingly, the development and realization of the health-saving competence of a Physical Education teacher involves the formation of sophrosyne both in him and in the students. In this case, sophrosyne is a cross-cutting, systematic and determining personality-behavioral and mental quality that ensures the preservation of psychological, physical and social health.

The development of sophrosyne is one of the pedagogical and personal-professional conditions for the prevention of sudden cardiac death and other acute cardiac pathology in Physical Education. This is due to the fact that the person who has developed sophrosyne minimizes risky, stressful, provocative, “hybrid” (caused by pride, excessive self-love, demonstrative), extreme, expansive behavior and understand the limits of their capabilities. Thus, sophrosyne minimizes the impact of psychological and social conditions on the development of stress and extreme overload on the body. Accordingly, the likelihood of the formation of dangerous life situations and the possibility of the development of etiological (causal) factors of cardiac pathology. Harmonious and moderate “Sustainable Development Man” does not create stress, problems and troubles for himself, his heart, neither to others, nor to the Earth. Thus, from a professional standpoint, we view the development of sophrosyne as a competent and personally-oriented way of greening, harmonizing and axiologizing the health-saving competences of Physical Education teachers and physical health technologies and practices.

Sophrosyne is also an educational condition for the formation of an “ecophilic future” and the preservation of health and life through the harmonization of human relations with himself, with planet Earth, with the future and with society. Motor activity, which is a manifestation of human nature and, accordingly, the main activity in Physical Education classes is presented as an effective way of forming sophrosyne.

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## School textbook as an object of pedagogical research

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**Abstract.** The article deals with investigations of scientists in the field of school textbook theory. The material has been structured taking into account the main components of this field of knowledge: purpose (the dual essence of this type of educational literature has been revealed – it is a carrier of educational content and teaching aids; position of the textbook as a model of integral learning process has been substantiated (systematization, consolidation and control, self-education, integrating, coordinating, developmental-educational), structure (general didactic structure of the school textbook covers the text and non-text components – the apparatus of mastering, illustrative material, orientation apparatus), methods of analysis and evaluation (distinguish traditional and theoretical) – analytical and formalized methods; the structural-functional approach to the textbook analysis has been proved). The peculiarities of textbooks for elementary school have been analyzed: the most complete definition of this phenomenon has been formulated; the leading functions of the textbook addressed to junior students have been defined – informational, developmental, educational, motivational; the features of structural components (taking into account the age of students) have been specified; methods of analysis and evaluation of the textbook have been classified: methods of analysis of the manuscript, methods of evaluation of the textbook itself, diagnostic evaluation *ex post facto*; a comprehensive approach to the analysis of textbooks for elementary school has been proposed; methods of analysis of certain aspects of the textbook (motivational component, developmental orientation, etc.) have been offered.

### 1 Introduction

The information society determines the requirements for general education of students as a necessary component of the quality of the national education system – to obtain the ability to learn, to gain the ability to self-study throughout life. In this aspect there is a need for modernization forms, methods and learning tools, but the dominant role in this process belongs to the content of education as a model of society's requirements for younger generation. A textbook is a material expression of the content of education, so this type of educational literature must meet the characteristics of the dominant concept – a personality-oriented one – of teaching at a particular stage of development of pedagogy and school.

Let's admit that school textbooks have been the subject of researches by a number of scientists in different directions: essence, functions and structure of a textbook (V. Beilinson [1], V. Bepalko [2], D. Zuev [3], E. Perovsky [4]) ; analysis and evaluation of a textbook (V. Beilinson [1], F.-M. Gerard [5], Y. Kodliuk [6], X. Roegiers [7], O. Topuzov [8]); features of a textbooks for elementary school (N. Bibik [9], L. Zankov [10],

Y. Kodliuk [6], O. Savchenko [11], N. Khrebtova [12]); methodical bases of creation textbooks on separate subjects (N. Burynska [13], V. Redko [14], I. Smagin [15]). UNESCO researches in the field of school textbooks is an important area of this investigation: ways to reflect in the school textbook the concept of learning for sustainable development (J. Gilbert [16], P. Lengrand [17]); educational, developmental and upbringing potential of the textbook (E. Gachukia [18], D. Georgescu [19]); approaches to the analysis and evaluation of this type of educational literature (A. Reints [20], R. Seguin [21]). The process of formation of the ability to work with textbooks indirectly deepen theoretical aspects of textbooks, which relate to the organization of work with textbooks (Z. Berkyta [22], O. Yanchenko [23]). Thus, currently there is no special study that would comprehensively represent the approaches of scientists to the construction of a school textbook as a model of a holistic learning process in a person-centered paradigm of education.

*The purpose of the article* is to systematize researches of scientists in the field of school textbook theory as a conceptual basis for creating a textbook. With this aim: to clarify structural components of the theory of school textbooks; to analyze available scientific fund on the problem of school textbook science; to single out researches of scientists in the field of school textbook theory for each of its

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structural components; outline new trends in this area of pedagogical research.

## 2 Results

Let's admit that theoretical foundations of textbooks have been explored as a special branch of scientific knowledge combining pedagogy (especially didactics), subject methods, psychology – the theory of school textbooks (or textbook). A textbook models an integral teaching process (content, forms, methods, etc.), it is primarily the object of pedagogical researches, including didactic.

There are two levels in the theory of a school textbook – general theoretical and methodical (D. Zuev [3], I. Lerner [24], etc.). At general theoretical level universal principles of designing a textbook (functions, structure, etc.) has become the subject of study; methodical level is expressed in the application of general provisions to a textbook creation on individual subjects.

### 2.1 General theory of the textbooks

Let's reveal the main experience of researchers in the general theory of the school textbook. The main structural components of this field of knowledge are as follows: the essence of the textbook, its functionality, the structure of the textbook, types of textbooks, methods of analysis and evaluation of the textbook, and others (figure 1).

Textbooks have become the subject of theoretical analysis since 1955, when the results of scientific investigation of E. Perovsky "Methodical construction and language of the textbook for secondary school" were published [4]. The author provided the definition of this phenomenon: "This is a textbook that contains a systematic presentation of knowledge in a particular subject, necessary for students to learn" [4, p. 22]; its structural components were singled out. Let's admit that the scientist did not use the term "structure", but "methodical construction of a textbook", which meant the internal form of the structure of the textbook, according to him. E. Perovsky attempted to identify original elements of the textbook: introduction, sections, articles (paragraphs), drawings, conclusions, questions and tasks, additional apparatus (various indexes, reference tables, etc.). The lack of a feature based on which the specified division was offered was a significant disadvantage of the proposed structure [3].

The theory of the school textbook gained the highest development in the researches of V. Beilinson [1], V. Bepalko [2], D. Zuev [3], and I. Lerner [25, 26]. Here's the list of their investigations aspects of school textbooks: purpose of the textbook, its functions, structure, methods of analysis and evaluation of the textbook.

Scientists admit its dual essence – the content of education and teaching tools, as the unity of content and procedural aspects. Significantly specifies the studied aspect of the problem of I. Lerner's position on the textbook as a strategic and tactical (methodological) model of the learning process [26]. As a strategic model, it reflects the main elements of this process: goals, content, techniques and

methods, organizational forms. At the same time, according to the scientist, each textbook is a tactical model of the educational process, as it offers its universal structure. The teacher modifies the proposed model, transfers its main features to the real learning process, taking into account the age and individual characteristics of students, the type of school, the conditions in which it occurs.

The analyzed materials showed that scientists mostly admit the following functions: informational, transformational, systematization, consolidation and control, self-education, integrating, coordinating, developmental and educational; the concept of the leading function has been proposed (developmental and educational function [3], the function of leading the process of obtaining the content of education [25]).

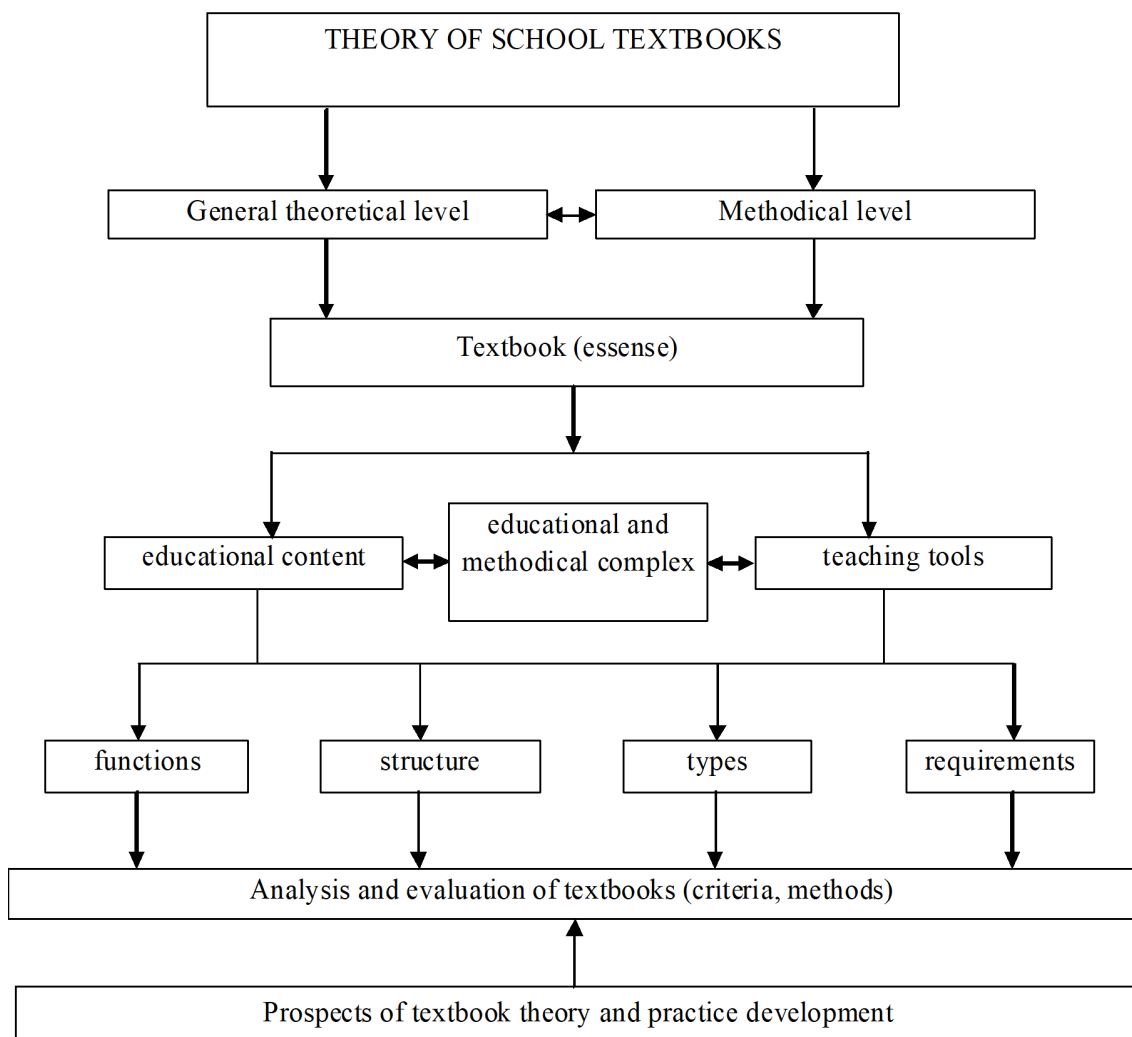
The general didactic structure of the textbook was developed by D. Zuev. It covers the following elements: the text – the main, additional, explanatory, and non-textual components – the apparatus of the organization of assimilation (educational tasks and exercises, samples of records, memos, summary tables, printing selections, etc.), illustrative material (leading illustrations, equal to the text and those that serve the text), the apparatus of orientation (preface, table of contents, rubrication, signals-symbols, list of references, indexes (subject, noun, subject-noun, etc.), footer), selected taking into account the leading function.

V. Beilinson proposed a generalized classification of methods of analysis and evaluation of school textbooks. The scientist divided the available methods into two groups: traditional, including peer-review, comparative review, historical-comparative analysis, study of the opinion of those who use textbooks (open questionnaire, interview, general survey) and theoretical-analytical and formalized (scientific and professional accuracy of the textbook, checking the compliance of textbooks to the curriculum, scoring methods, system-structural, partially-aspect, narrow-functional, statistical). A special role in the context of this the well-known didactic assigns partially-aspect and narrow-functional methods, as they are "developed to identify and improve certain properties of a textbook or a training kit" [1, p. 272]. The structural-functional approach to the analysis of this type of educational literature was substantiated, the structural components of which were structural analysis of the textbook and its functional characteristics.

Let's admit that at present the theory of school textbooks has been developed mainly at methodological level, as proved by the analysis of articles in the collection of scientific researches "Problems of modern textbooks", which has been periodically published by the Institute of Pedagogy of NAPS of Ukraine since 1999 (for example, [9, 27, 28]).

The researches of UNESCO scientists significantly deepen the understanding of the purpose of the textbook and its place and role in the educational process. A lot of statements relate to teaching for sustainable development, in particular, much attention is paid to the role of the textbook in achieving the goals of sustainable development: advice to compilers on how to integrate competencies to





**Figure 1.** Structural components of theory of school textbook

ensure sustainable development in the subject content; criteria for selecting topics for sustainable development training; educational tasks that contribute to the achievement of sustainable development goals [16, 17].

The educational, developmental and upbringing potential of school textbooks has been revealed. It has been found that the educational potential of the textbook is that the book is considered a reliable source of information. The content of the textbook should be based on modern scientific achievements and meet the requirements of pedagogical practice. Developmental potential includes a motivational component and motivating students to further search. UNESCO scientists also point to the role of the textbook as a means to achieve the goals of sustainable development. The educational potential of the textbook is realized through the proper reflection of cultural values, forming the concept of culture of their own people and intercultural consciousness. This also includes the problem of gender equality, peace and its implementation in everyday situations, overcoming stereotypes and prejudice against people [18, 19].

UNESCO researches on the analysis and evaluation of school textbooks covers two aspects – the development of

criteria for evaluating the quality of the book and appropriate methods of collecting information about it [20, 21]. Let’s admit the research of A. Reints, who substantiated 18 criteria for evaluating the quality of textbooks and other educational materials. Note that the following aspects of the book are subject to analysis: content (compliance with the curriculum, correctness and relevance of the information provided, etc.); pedagogy (conformity of the didactic model to modern psychological requirements; possibilities of using interactive, group and active learning, etc.); embodiment (readability, effective and appropriate illustrations, etc.) [20].

## 2.2 Features of textbooks for elementary school creation

A separate area of the researches concern the peculiarities of the construction of the textbook for elementary school (N. Bibik [9], L. Zankov [10], Y. Kodliuk [6], O. Savchenko [11], N. Khrebtova [12] and others).

Researchers have proposed the most complete definition of this phenomenon: “it is a type of educational literature that represents knowledge and activities in a particular

subject in accordance with state educational standards and curriculum requirements, taking into account the features of this subject (its dominant function), type of school, age and other features of students and it is based on the dominant concept of teaching” [6, p. 19]. Let’s analyze this aspect of the problem.

The statement on a textbook for elementary school as a model of the learning process, which is reflected in the content of a textbook (a textbook is the main source of the content of elementary education) and in didactic organization of educational material (as a means of learning), has been specified. The textbook is created to capture its main elements as a source of educational content: knowledge, skills, creative experience, emotional and value attitude to the world. At the same time, the is considered by the scientists as a means of learning (for teachers and students), and it is appropriate to reflect the methodological approaches to the study of the material, the form of organization of educational activities of students; to form the ability of junior students to work with educational literature by means of the textbook.

The approach of scientists to the selection of the leading functions of textbooks for elementary school is noteworthy, such as: developmental (L. Zankov [10]); informational, developmental, motivational (O. Savchenko [11, 29]); motivational (N. Bibik [9], N. Khrebtova [12]) and others.

The leading functions of a modern textbook, addressed to junior students, are information, development, education, motivation (Y. Kodliuk [6, 27, 28]), based on the following considerations: firstly, textbooks for elementary school should model the integral pedagogical process, including learning activities as a leading one at this age, i.e. fully implement motivational, informational and developmental functions that reflect the structural components of this activity; secondly, the philosophy of child-centeredness focuses on the proper presentation in the textbook of the experience of emotional and value attitude to the world as an element of educational content, ie provides strengthening the educational orientation of the textbook (taking into account the sensitivity of junior students to educational influences). Information function is realized by presenting knowledge of a particular subject and activities aimed at obtaining them. The developmental function of a textbook is to provide the means of a textbook developmental impact on the personality of the junior student, which is carried out in the following areas: development of mental processes; formation of general educational skills and abilities; development of creative abilities. The main purpose of educational function is to reflect experience of emotional and value attitude to reality in textbooks properly (taking into account the specifics of the subject). Motivational function directs the development of students’ intellectual feelings, positive studying motives, cognitive needs and interests, i.e. the affective sphere of students [6].

Regarding the structure of the textbook, a text traditionally plays dominant role – it’s a complex system that includes both its external design, which helps to differentiate importance of educational material, and internal struc-

ture (pedagogically appropriate content, successful speech design, logic and consistency of presentation), which ultimately ensure the implementation of the basic functions of studying – educational and developmental. We consider the classification of educational texts by functional style to be scientifically productive. Taking into consideration the main function of a text as a structural component of textbooks is to share knowledge, and the main types of knowledge are knowledge about the world around us, about ways of cognitive and practical activities and values, subject-oriented, instrumentally oriented and value-oriented texts are distinguished.

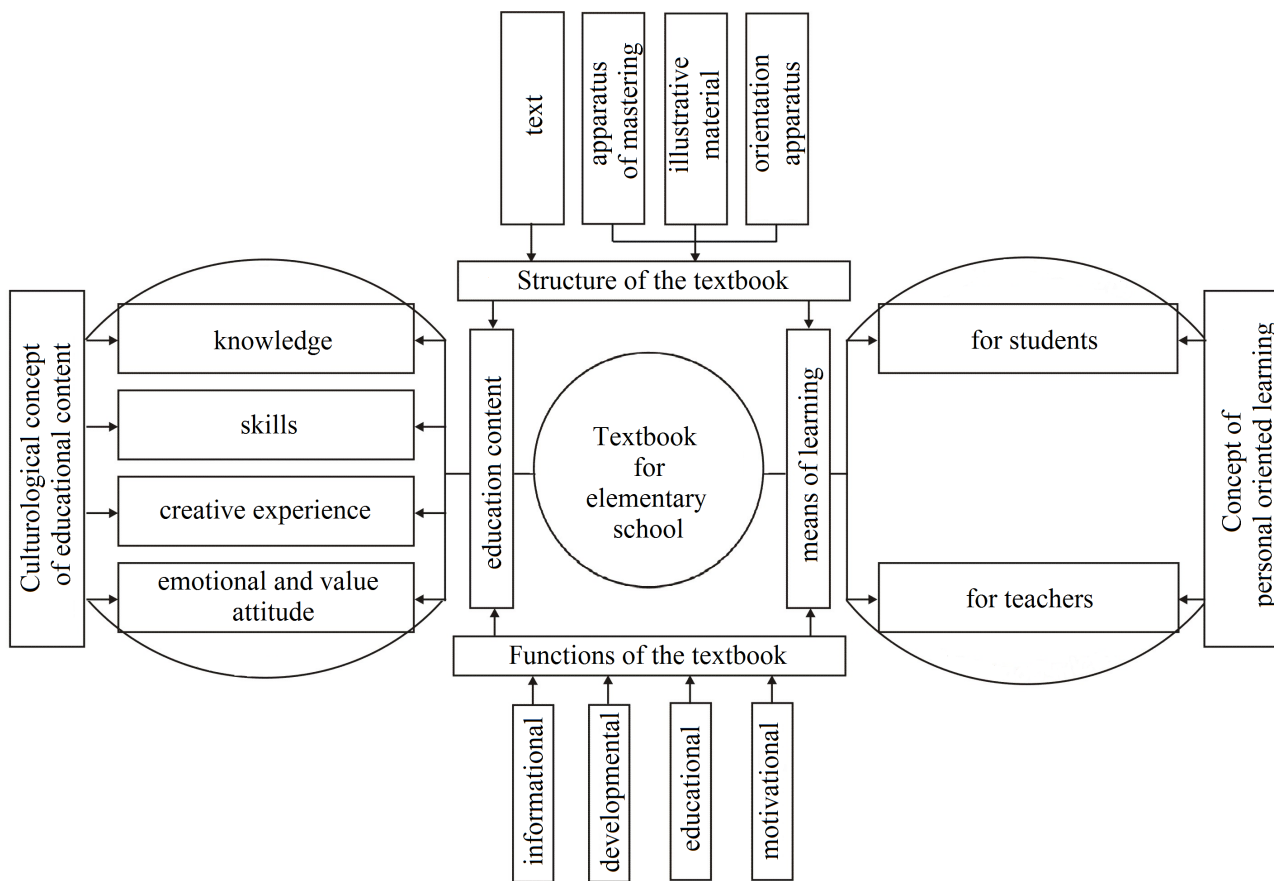
Features of the textbook addressed to junior students are largely due to the specifics of the use of educational tasks and exercises – the main element of the apparatus of the organization of assimilation, which must meet the following requirements: be based on the content, motivation and procedural components of studying; to determine the development of not only reproductive, but also creative activity and reflexive qualities of a student; be located in the textbook in accordance with the main stages of the studying process; fully represent the four-component concept of the content of education (knowledge, skills and abilities, creativity, emotional and value attitude).

Illustrative material is closely connected with the subject content of the textbook, which contains certain information, as well as a means of educational influence on students. The didactic bases of the textbook illustration for elementary school have been proposed: full realization of the leading functions of the textbook – informational, developmental, educational and motivational; connection of illustrative material with other structural components (first of all with the text) has been didactically proved; adequacy of visual images to age features of junior students [6].

Analysis of textbooks for elementary school shows that there is an intensive use in the structure of school textbook of various elements of the apparatus of orientation at the present stage, especially signals-symbols, but the problem of their unification remains relevant (at least within one educational field).

Clarification of theoretical foundations of the textbook made it possible to create a model of the modern textbook for schools of the first degree (figure 2).

The variable system of school education determines the development and creation of variable educational literature. We distinguish between variable and alternative textbooks: variable are different types of textbooks that are carriers of the content of education at a certain level of education (for example, within the school of the first degree); alternatives are textbooks of the same type that offer different learning technologies, author’s approaches to the didactic and methodological organization of educational material. Given this we offer the classification of textbooks by the content of education: by the depth of reflection of the content of education (basic, including parallel, and differentiated); by the nature of the reflection of the content of education (integrated and textbooks for certain educational areas); by the method of organizing educational material (problem, discussion, programmable, developmental).



**Figure 2.** Theoretical model of the modern textbook for elementary school

There are special methods of researching a textbook and collecting information about it. Due to the fact that the textbook can be analyzed at different stages of its development and creation, the following classification is considered expedient and easy to use: methods of manuscript analysis (descriptive, comparative, matrix); methods of assessment of the actual textbook (observation, questionnaire of teachers, survey of students, study of the level of knowledge of students, peer review); post factum diagnostic assessment as an intermediate form of the textbook verification.

In order to find out the most important generalizing characteristics of the textbook, it is offered to use a comprehensive analysis of the textbook addressed to junior students in the following areas: functions (informational, developmental, educational, motivational); structure (text, apparatus of organization of assimilation, illustrative material, apparatus of orientation); printing design (compliance with sanitary and hygienic requirements, aesthetics of the textbook); the textbook in the system of educational and methodical complex (the textbook is an independent element of the educational process; connection of the textbook with other components of educational complex and consistency; textbooks and methodical literature for teachers, their connection) (taking into account the developed criteria).

The scientists attempts to offer methods of analysis of certain aspects of the textbook (scientific, educational ori-

entation, etc.) are pedagogically proved. Here are some samples of the following methods developed by members of the school textbook research laboratory of Ternopil Volodymyr Hnatiuk National Pedagogical University:

- motivational component of the textbook for elementary school. Motivational component of the textbook is realized through the motivational function and covers the following components: emotional content of the educational material; ways of its didactic organization; the textbook design. According to the selected components, a method of analysis of this component are developed, which provides a research of textbooks according to the following criteria: selection of information taking into account cognitive interests of students (use of interesting cognitive material, genre diversity, coverage of personally relevant topics), provision of appropriate features of the content of educational material (emotionality curiosity, accessibility, value) – emotionality of the content of educational material; availability of practical works, didactic games, means for emotional and evaluative activity, group forms of work, certain ways of teaching, developmental means, means of goal setting – ways of its didactic organization; compliance with hygienic, aesthetic and didactic criteria – the textbook design [12];
- developmental function of the textbook. It is proved that the developmental influence of the textbook on a personality of a junior student is carried out in the following di-

rections: development of mental processes, formation of general habits, skills and abilities. For the purpose of the analysis of the function, there are different types of educational texts of educational direction (instrumentally oriented) in textbooks for students of elementary school (texts on development of mental processes, on formation of general skills and abilities, on formation of creative abilities) and relevant tasks and exercises, taking into account semantic, motivational and procedural aspects of learning. A quantitative and qualitative description of educational tasks should be the next step, which makes it possible to determine the following points [6]:

- a) whether all components of the developmental function are implemented in the textbook;
- b) what is the percentage of these exercises (by groups) of the total number of educational tasks;
- c) what types of tasks and exercises play the most and the least important role in the textbook;
- d) an adequacy of quantitative and qualitative characteristics of educational tasks of one textbook with similar indicators of another one (within one class – for different subjects, compared with textbooks (one subject) for different forms – both previous and next – in order to clarify positive dynamics of inclusion of these elements of the apparatus of the organization of assimilation in the content of textbooks);

- technological structure of the textbook addressed to junior students.

More and more scientists think that the distinctive feature of the modern textbook is its adaptability, although the achievements of researchers in this aspect are not full. O. Savchenko associates this sign of the textbook with two important points [29]:

- 1) the modern textbook should have clear signs of a teaching technology, the teacher could see the future scenario of learning activities of students viewing its contents;
- 2) it has gradually but consistently and persistently prepare children for learning. According to the pedagogue, this aspect must be appeared in several areas, especially in the motivational (use variety of means to encourage and support the success of self-employment in the content of a textbook, the development of cognitive needs and interests) and procedural (the author's ability to design self-educational process in the text, tasks, schemes etc.).

Our understanding of technological textbook for elementary school based on its interpretation as a mean of training for teachers (to offer a tentative model of organization in school) and for students (to ensure mastery of knowledge and skills, to form the ability to learn). This technological structure of the textbook is directed to junior students. It is such a feature, due to which an educational book effectively serves as a means of training for teachers and students, and it is integrally simulates educational

process; it grants technological norms and reflects some teaching technologies based on the dominant paradigm of education.

Thus, the structural components of textbooks adaptability for elementary schools are considered the following points:

- textbook as strategic and tactical model of the teaching process,
- textbook as a teach-yourself book,
- functionality of the textbook,
- consistency of the textbook with certain education technologies,
- technical side of the textbook.

In accordance with the structural components of technological side of the textbook, we have also proposed the main criteria of studying this quality of the textbook:

- textbook as a strategic and tactical model of the teaching process (aim orientation of the textbook, content orientation, methods and techniques of teaching, forms of organization of educational activities represented in the book),
- textbook as a self-teacher (reflection of the main stages of pedagogical process; motivational, semantic and procedural components of educational activities),
- functionality of the textbook (realization leading functions by means of the textbook – information, developmental, motivational, educational),
- consistency of the textbook with certain education technologies (reflection personality-oriented learning technologies in the textbook – technologies of organization of educational cooperation, technologies of differentiated learning, game educational technology, nature-appropriate technologies),
- technicality of the textbook (printing, quality of illustrations, convenience characteristics).

The technology of representation (and hence the method of analysis) in textbooks for junior students, the ability to learn – the key competence of elementary education – has been substantiated. Three-component structure of this competence (content, motivation and procedural components) has been provided, the proposed technology provides the following procedures [27]:

- a) presentation in textbooks of information about the culture of mental work, the content of general skills, the ability to learn as an information value (in the form of subject-oriented, instrumentally oriented and value-oriented texts);
- b) the availability of tools (learning tasks and exercises) for the formation of skills to organize the workplace, plan learning activities, work with the textbook, analyze, compare, summarize, exercise self- and mutual control;
- c) the use of value-oriented texts aimed at making students aware of the importance of knowledge, the formation of lasting interest in learning.



### 3 Conclusions

Thus, we have systematized the main developments of scientists in the field of school textbook theory in certain areas: its essence, functions, structure, types of textbooks, methods of analysis and evaluation. Emphasis is placed on the peculiarities of the construction of textbooks for elementary school and on the methods of research of certain aspects of the textbook addressed to junior students. As a trend in the development of the theory of school textbooks, we define different of methods for studying certain aspects of a textbook, addressed to junior students

The study does not cover all aspects of the analyzed problem. Further prospects are possible in the analysis of the work of textbooks, relating to the peculiarities of the construction of school textbooks on certain subjects (methodological level of school textbook theory); in the research of didactic bases of interrelation of the textbook with other elements of an educational and methodical complex; in the study of international experience in research, in particular the activities of the Georg Eckert Institute for International Textbook Research (Germany) and the International Association for Research on Textbooks and Educational Media (IARTEM).

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## Training of future primary school teachers for the formation of functional literacy in pupils

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**Abstract.** The main problem area of the article is the current issues of pedagogical science concerning training of future primary school teachers for the formation of functional literacy in pupils. The emergence of these issues is determined by globalization and integration processes in the educational system of Ukraine and in the world, social transformations that affect the content of primary education, as well as modern humanitarian, scientific and technological development. This requires each individual to show functional literacy. Based on this, there is an urgent need for fundamental changes in postclassical education, caused by modern European theories, educational models, the latest tools of professional activity of primary school teachers who are responsible for the provided educational services. These changes are necessary in the context of the recommendations provided by leading European and international educational organizations, and are confirmed by the results of international PISA research. The purpose of the research involves establishing the essence of the basic concept of “functional literacy” and its structure. The research found a link between functional literacy and soft skills. The program of the experiment provides for the diagnosis of the formation of functional literacy in future primary school teachers. Questionnaire and testing of final year students’ in specialty 013 Primary Education of Bohdan Khmelnytsky National University of Cherkasy (Ukraine) confirmed the assumption that in most students functional literacy is formed at the middle level.

### 1 Introduction

The topicality of the research is due to the changing priorities that accompany the current reform processes in the field of primary education in Europe and Ukraine [1]. These changes mostly concern the theory and practice of teaching, critical revision of the educational paradigm, rethinking the methodology of education in the context of world trends. In this regard, current and future issues of pedagogical science need to be urgently addressed, in particular, psychological and pedagogical, philosophical and socio-cultural aspects of education, training and education of the younger generation, modern theories and technologies of primary education. The emergence of these issues is determined by globalization and integration processes, social transformations, modern humanitarian, scientific and technological development. Thus, if at the end of the 20th century parents and teachers were first interested in the educational achievements of primary school pupils, now the leading role is given to skills, related to personal qualities and attitudes, social skills and management skills. Based on this, we can conclude that the determining factor for self-realization of the individual in the educational process of primary school and subsequent stages of learning is functional literacy, rather than a fixed set of professionally oriented competencies.

Functional literacy is close to, but not identical to, soft skills. However, in the program materials of UNESCO and the European Commission, soft skills are called universal or functional competencies [2–4], and the fact of their possession is called functional literacy [5]. In the context of globalization changes in the theory and methods of teaching of future primary school teachers, there is an urgent need to establish the minimum level of functional literacy that every European needs for adequate self-realization in society. It is no coincidence that Microsoft in the selection of applicants gives priority to public speaking and communication skills, possession of office software, and the ability to self-organization. Forbes considers communicative competence, creativity, writing quality texts, teamwork, basic computer knowledge and the ability to “re-engineer” – the willingness to do the usual things in a new way to be the most important. The German wave celebrates communication and management talents: public speaking, the ability to persuade, lead, manage, make presentations, approach people and resolve conflict situations. The British e-learning platform SkillsYouNeed highlights personal skills (time management, self-development, management of emotions and even nutrition, body care, sports training, effective sleep) and interpersonal (communication, teamwork, negotiation, conflict management), leadership skills, as well as writing skills and basic mathematical knowledge. In European countries, the content of each group of abilities is not fixed, it is constantly expanding.

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The European Dictionary of Skills and Competences contains thousands of titles and continues to grow. Based on this, we can conclude that the determining factor for self-realization of each individual is functional literacy, rather than a fixed set of professional competencies.

UNESCO experts determine that literacy in its modern sense is more than just the ability to read and write. It means the presence of communication skills in society. Literacy refers to the social practice of the individual, social relationships, knowledge, language and culture. Literacy has many forms of expression – written, computer, media, mathematical, sign, political. The UNESCO documents [6] refer to the creation of literacy culture, which provides for the formation of a constant need to acquire and improve it throughout life, about the creation of a literate environment – a society that learns permanently throughout the period of its conscious existence.

Acquisition of functional literacy has become one of the leading civil rights, the duty of a citizen, non-fulfillment of which has negative consequences for the individual and society as a whole. In the practice of international literacy studies, which are regularly conducted by UNESCO institutes, there is such a classification of its types [6]:

- prose literacy (involves understanding different types of texts, in particular, newspaper articles, prose and poetry),
- documentary literacy (the ability to present information in a document and draw it from there),
- mathematical (computational) literacy (ability to make simple calculations and understand quantitative indicators).

This should be taken into account by future primary school teachers during the formation of functional literacy in pupils.

The International Adult Literacy Survey identifies such levels of literacy [6]:

- 1) the person has serious difficulties in reading, understanding and interpreting simple texts and does not realize that this is a problem,
- 2) the person reads simple texts, skills of their interpretation are rather limited, the problem of insufficient literacy is realized,
- 3) the person reads quite well, but may have difficulty understanding complex texts. Experts consider this level to be the minimum allowable for full functioning in modern society,
- 4) high level of literacy, which implies the presence of developed general cultural and professional skills.

The need to solve the problem of training of future primary school teachers for the formation of functional literacy in pupils is emphasized in regulations. Among them should be noted the Law of Ukraine “On Education” which emphasizes that the following skills are common to

all competencies: reading comprehension, ability to express one’s opinion orally and in writing, critical and systematic thinking, ability to logically substantiate position, creativity, initiative, ability to constructively manage emotions, assess risks, make decisions, solve problems, ability to cooperate with other people. In the Concept of New Ukrainian School the description of the main competencies is supplemented as ability to read and understand what is read, ability to express an opinion orally and in writing, critical thinking, ability to logically justify a position, show initiative, create, ability to solve problems, assess risks and make decisions, ability to constructively manage emotions, apply emotional intelligence, teamwork.

The skills and abilities represented in these program documents best characterize the functional literacy, on the formation of which depends the socialization of the child of primary school in society. As mentioned above, functional literacy is close in content to soft skills, as it also covers the range of personal qualities, social skills and career building skills. It is no coincidence that these soft skills are considered flexible. These skills are also called functional, and the result of their formation – functional literacy. In fact, it is the result of mastering them. It is clear that future elementary school teachers should be trained in advance for its formation in pupils. It is necessary to begin this process from the first years of study in higher school, and for this purpose during studying of disciplines of an obligatory component of professional training it is desirable to update in time the theory and a teaching technique, program results of training as close as possible to the established European requirements.

Therefore, the problem of training of future primary school teachers for the formation of functional literacy in pupils is relevant given the new trends in modern theory and methods of teaching.

The purpose of the article is to clarify the role of future primary school teachers in the formation of functional literacy of pupils. Before considering the peculiarities of training future primary school teachers for this activity, we need to define the essence of the key concept of “functional literacy”, to analyze its structure. We also plan to diagnose the formation of functional literacy in future primary school teachers and pupils. In the course of the research we will try to compare functional literacy with soft skills, to find out which components of functional literacy are given priority by parents of modern schoolchildren and future primary school teachers.

## 2 Literature review

Let’s try to analyze why the future destiny of each individual depends on the training of future primary school teachers for the formation of functional literacy of pupils.

Revealing the essence of the main category of the problem we study, we note that “functional literacy” is “the ability of an individual to apply all lifelong knowledge, skills and abilities to solve the widest range of life problems in various fields of activity, communication and social relations” [7]. As an argument in support of the priority role of functional literacy in the training of future

primary school teachers, we see in the responsibility that modern society places on him. After all, it is the primary school teacher who lays the foundation for a young person, which in the long run will determine the success in the modern labor market.

In 2018 for the first time 6 000 Ukrainian teenagers joined the world's largest study – PISA, which aims to forecast the state of the labor force in the labor market in the long run – in 10 years. With the help of PISA the level of mastery of three basic competencies by graduates of general secondary education institutions – reading, mathematics and natural science. “The PISA scale has six levels: 1 – least, 2 – base, 3–4 – sufficient, 5–6 – the highest level. If a person has not reached the basic level in mathematical, reading and natural sciences, he will not be able to interact qualitatively with society, because he does not see the existence of science in life, cannot solve basic life problems and is not able to work with text” [8].

According to international studies, Ukraine ranks approximately 37-42 in reading, 41-46 in mathematics and 35-42 in science, which coincides with the ranking of such post-Soviet countries as Belarus, the Slovak Republic and Hungary: “In general, Ukraine lags behind countries in terms of performance indicators OECD (Organization of economic cooperation and development – founding countries PISA) 39 points in mathematics, 23 points in reading and 22 points in natural sciences” [8]. It is believed that the best results have now been achieved in those countries where the education system has been intensively reformed.

Let's dwell in more detail on the consequences that this result has in the future for the full functioning of graduates of general secondary education in society. Our analysis of normative documents and research results of scientists confirms: the leading criterion quality of their education is “reading competence” as the ability to understand printed texts, use them to achieve their own goals, development of knowledge and opportunities, active participation in public life. In our opinion, in terms of content, “reading competence” is synonymous with “functional literacy”, which has a general educational significance. In our opinion, the level of functional literacy of Ukrainian pupils is characterized by academicism, theoretically oriented nature, which does not allow to effectively solving everyday problems, to navigate freely in situations of life choices, to work with an informative array of media.

Among the reasons for this situation in general secondary education, Marta Kondracka-Szala and Joanna Malinowska [9], Safiyeh Shami and Naser Nastiezaie [10], Rissaphop Treesuwan and Tanes Tanitteerapan [11], call the lack of practical orientation and detachment from the realities of life science and mathematics training, overload of curricula and textbooks, lack of attention to the formation of primary school pupils learning and intellectual skills, and they lack a critical attitude to the perceived information, the ability to interpret it in accordance with changed conditions and circumstances. The way out of this situation is seen in strengthening the quality of education and the introduction of a person-centered model of learning at all levels, starting with the primary school.

It is clear that only a primary school teacher who is aware of this problem can form a functionally literate personality. Given the results of their own research let's try to identify the components of “functional literacy” as a key competence of a primary school pupils:

- 1) orientation in the environment in accordance with accepted values, expectations and interests;
- 2) ability to make decisions independently and take responsibility in a situation of choice;
- 3) ability to be responsible for decisions made, as well as to be responsible for their family members;
- 4) formation of the ability to learn and readiness for constant self-improvement;
- 5) ability to easily navigate in unusual situations;
- 6) adaptation to society and the ability to influence it;
- 7) ability to compromise and make a joint (collegial) decision;
- 8) tolerance;
- 9) perfect command of oral and written speech as a means of interpersonal interaction;
- 10) possession of modern information and communication technologies.

We consider it appropriate to note that “functional literacy” seems to be synonymous with another concept – soft skills, which are formed much earlier than “hard skills”, which have a professional nature and are acquired in the process of professional training in vocational and higher education [12]. Such soft skills can be divided into three groups [13]:

- 1) skills related to personal qualities and attitudes (responsibility, discipline);
- 2) social skills that determine the success of adaptation in society, the ability to work in a team, emotional intelligence;
- 3) managerial skills, including critical thinking, willingness to lead, the ability to make decisions and be responsible for its consequences.

It is no coincidence that these soft skills are considered flexible. In foreign scientific and pedagogical literature, these skills are also called functional, and the result of their formation – functional literacy.

Undoubtedly, the reformation processes currently taking place in the New Ukrainian School (NUS) create the basis for the formation of all components of functional literacy. This is facilitated by the creation of a special educational environment and personal orientation of each student in it to form a personal semantic reflection of the scientific picture of the world through the constant expansion of concepts and ideas.



The “three whales” of these transformations become educational environment of development (in NUS – it belongs to children), personification (harmonious combination of individualization and differentiation of learning) and motivation (based on reflection) of each subject of the educational process.

### 3 Methods

The methodological basis of our study is the competency approach, which is based on a set of hard and soft competencies, the mastery of which makes a person mobile, adapted to the needs of the changing labor market. In the program documents of UNESCO a kind of conglomeration of skills inherent in each individual, in which they are harmoniously combined. According to the International Board of Standards for Training, Achievement and Instruction, the concept of “competence” is presented as a set of knowledge, skills and attitudes that enable an individual to effectively carry out activities or perform certain functions aimed at to acquire certain standards in the profession or type of activity. A similar view of competence is presented in the Project Tuning – Project “Harmonization of Educational Structures in Europe” [14] as a dynamic combination of knowledge, understanding, skills, abilities and abilities, which can be attributed to the group of subject-specific or general. We follow the same approach, as it is the basis for the reform of primary school in Ukraine on the basis of the Concept of the New Ukrainian School.

In the course of research the complex of methods developed by us is applied. In particular, the following:

- surveys of parents to determine their attitude to the formation of functional literacy of primary school pupils,
- questionnaire of future primary school teachers to diagnose their readiness for the formation of functional literacy in pupils,
- ranking according to the degree of importance of the main components of functional literacy, which future teachers should form in pupils,
- testing to diagnose the readiness of future primary school teachers to form functional literacy in pupils by means of personality-oriented learning.

For the organization of research and experimental work we have developed an experimental program, the purpose of which is to diagnose the readiness of future primary school teachers to form functional literacy in pupils. The objectives of the experiment include:

- 1) development of the experimental program;
- 2) the choice of diagnostic methods to determine the readiness of future primary school teachers to form functional literacy in pupils;
- 3) implementation of quantitative and qualitative analysis of the obtained empirical data.

Diagnostics of readiness of future primary school teachers was carried out on the basis of Bohdan Khmelnytsky National University of Cherkasy: the study involved students of the final year in specialty 013 Primary education (educational degree “Bachelor” 64 – respondents).

The program of research and experimental work provides for three successive stages: organizational, basic and final. The first stage – organizational – is provided: choice of research topic, formulation of the conceptual apparatus (object, subject, goals and objectives of the study, a set of methods of psychological and pedagogical research); implementation of theoretical analysis of psychological-pedagogical and scientific-methodical literature, legislative documents on the research problem; generalization of scientific achievements of famous scientists on issues that contribute to the solution of the chosen problem. In the second stage – basic – the following tasks are solved: choice of place for research and experimental work, respondents; establishing the possible duration of the experiment; choice of methods for diagnostics the readiness of future primary school teachers to form functional literacy in pupils. At the third stage – final – such work was carried out: the results of research and experimental work are described; quantitative and qualitative analysis of the obtained empirical data was performed.

When preparing for personality-oriented education of primary school pupils, future teachers must take into account the psychological patterns of formation of established behavioral skills and preferences, as well as stable personal formations. In this context, modern psychologists recommend future primary school teachers to distinguish between three levels of development and further implementation of socially necessary knowledge, norms, skills, values, which are broadcast by the social situation of development and the system of primary education, in particular:

- first level (“I know”) – awareness, learning, general motivation to change certain stereotypes of professional behavior of teachers,
- second level (“I can”) – practical ability to apply the obtained information in new circumstances,
- third level (“I always do”) – development of value preferences, sustainable modification of professional behavior in accordance with the acquired positive experience of independent implementation of values and behavioral strategies in real professional activity.

Based on the above, we propose to take into account the following criteria for the readiness of future primary school teachers to form functional literacy in pupils: *gnostic* (possession of information about the organization of personality-oriented learning); *operational-activity* (possession of methods, means and forms of organization of personality-oriented education of pupils); *behavioral* (positive experience of personality-oriented learning of primary school pupils, rejection of stereotypes, overcoming inertia).

A convincing argument for the formation of functional literacy in primary school pupils can be our survey of

127 parents of pupils in the first class of primary school Cherkasy gymnasium No. 9 named after O. M. Lutsenko. The poll was conducted during a parent meeting at the beginning of the 2019-2020 school year. To our question “What do you think primary school should give your child?” the following answers were received from the parents: “primary school should inspire our child to be successful in today’s world”, “primary school must form in our child the will and character”, “primary should teach our child to live among people”, “primary school should teach our child to constantly improve throughout life”. As we can see, the New Ukrainian School should take care of developing in each of its pupils’ functional literacy as a priority human competence of the new millennium. To do this, every future primary school teacher in the process of professional training must take care of the development of new values, the most significant of which are the following:

- recognition of the priority of each pupils personality,
- creating comfortable conditions for self-expression of each pupil, able to respect not only themselves but also other participants in the educational process,
- recognition of the right of each pupil to self-realization,
- the realization that each student is special, has a talent for something,
- abandon grades as a tool to punish pupils,
- recognize that teachers and pupils are equal participants in the educational process,
- try to talk less to yourself and give pupils the opportunity to express themselves in class
- awareness that sometimes pupils may know more than the teacher,
- to provide each pupil with a free choice of a way of performance of the set task, to support its individual trajectory of development.

To diagnostics the readiness of future primary school teachers to form functional literacy in pupils, we have developed criteria and indicators. Criteria and corresponding indicators have been developed by us personally taking into account the ability of future primary school teachers to master and further implement socially necessary knowledge, norms, skills, values, which are transmitted by the social situation of development and the primary education system (table 1).

## 4 Results

A convincing argument in favor of the formation of functional literacy in pupils by means of personality-oriented learning can be our survey of 127 parents of first-graders of the primary school of Cherkasy gymnasium No. 9 named after O. M. Lutsenko. The survey was conducted during a parent meeting at the beginning of the 2019–2020 school year. To our question “What do you think elementary school should give your child?” the following answers were received from the parents: “primary school should

teach our child to be successful in today’s world”, “primary school must form in our child the will and character”, “primary should teach our child to live among people”, “primary school should teach our child to constantly improve throughout life”.

As we can see, the New Ukrainian School should take care of developing in each of its pupils’ functional literacy as a priority human competence of the new millennium. To do this, every future primary school teacher must refocus in the process of professional training on the development of new values, the most significant of which are the following:

- 1) recognition of the priority of the personality of each people;
- 2) creating comfortable conditions for self-expression of each people, able to respect not only themselves but also other participants in the educational process;
- 3) recognition of the right of each people to self-realization;
- 4) awareness that each people is special, has something in something;
- 5) abandon grades as a tool to punish pupils;
- 6) recognize that the teacher as well as the people is an equal participant in the educational process;
- 7) strive to speak less to yourself and give pupils the opportunity to express themselves in class;
- 8) awareness that sometimes pupils can know more than a teacher;
- 9) to provide each people with a free choice of a way of performance of the set task, to support its individual trajectory of development.

To diagnostics the readiness of future primary school teachers to form functional literacy in pupils, we conducted a survey of 64 students in specialty 013 Primary Education of Bohdan Khmelnytsky National University of Cherkasy. The poll was conducted during at the 2019–2020 school year. Respondents were asked to answer the following questions: “What features of pedagogical interaction you had to get acquainted with during pedagogical practice in primary school?”; “What made you happy or upset?”; “Which, in your opinion, is the reason for the unprofessional attitude to pedagogical interaction with pupils?”; “What methods or technologies do you use to provide person-centered learning?”; “What do you know about the functional literacy of primary school pupils?”; “Do you see a connection between the provision of personality-oriented learning and the formation of functional literacy in pupils?”.

Elaboration of the received answers gave the following results. To the question “What features of pedagogical interaction you had to get acquainted with during pedagogical practice in primary school? What made you happy or upset?” respondents answered yes: “There is rudeness

**Table 1.** Criteria and indicators of levels of readiness of future primary school teachers for the formation of functional literacy in pupils

Levels	High	Sufficient	Medium
<i>gnostic</i> (possession of information about the organization of personality-oriented learning)	The future teacher is well versed in information about the organization of personality-oriented learning, constantly improves its methodological level, shows complete independence, listens to the advice of teachers-mentors, methodists, deputies of the director	The future teacher has an idea of the organization of personality-oriented learning, according to the schedule of advanced training raises the methodical level, if necessary, seeks advice from the methodists, deputies of the director	The future teacher is aware of the organization of personality-oriented learning, but change the style of interaction with students in no hurry, cares about his methodological level, but does not always listen to the advice of teachers-mentors
<i>operational-activity</i> (possession of methods, means and forms of organization of personality-oriented education of pupils)	The future teacher perfectly masters the methods, means and forms of organization of personality-oriented education of pupils, seeks to diversify ways of pedagogical interaction, makes efforts to provide comfortable conditions for all participants in the educational process	The future teacher has methods, means and forms of organization of personality-oriented education of pupils, uses different ways of pedagogical interaction, focuses mainly on pupils	The future teacher uses some methods, tools and forms of organization of personality-oriented learning of pupils, in pedagogical interaction prefers methods of control over the educational activities of pupils
<i>behavioral</i> (positive experience of personality-oriented learning of primary school pupils, rejection of stereotypes, overcoming inertia)	The future teacher has his own positive experience of personality-oriented learning of pupils, abandons stereotypes, in pedagogical interaction seeks to overcome inertia, pays considerable attention to the moral values of pupils, their personal qualities and social skills	The future teacher has a positive experience of personality-oriented learning of pupils, seeks to move away from stereotypes, in pedagogical interaction overcomes inertia, pays attention to the education of moral values of pupils, their personal qualities and social skills	The future teacher has experience of personality-oriented teaching of pupils, but is in no hurry to give up stereotypes, in pedagogical interaction is inert, takes over most of the powers, does not always pay attention to the moral values of pupils, their personal qualities and social skills

and tactlessness between pupils and teachers, which sometimes turns into shouting” 50% (32 respondents), “hostility” and “humiliation of the child” were stated 47% and 42% in accordance (30 and 27 respondents in accordance), “hypocrisy” and “deception” were observed 20% and 14% in accordance (13 and 9 respondents in accordance).

To the question “Which, in your opinion, is the reason for the unprofessional attitude to pedagogical interaction with pupils?” respondents answered yes: “not ready to meet modern society’s demands” 70% (45 respondents), 65% (42 respondents) consider their “practical training to provide person-centered learning satisfactory”, 49% (31 respondents) “not satisfied with their methodological training”, 61% (39 respondents) feel “insufficient psychological readiness for change in the New Ukrainian school”.

To the question “What methods or technologies do you use to provide person-centered learning?” most respondents (95% or 61 persons) traditionally called “microphone”, “group work”, “openwork saw”, as well as methods that became known thanks to innovations in the New

Ukrainian School – “Cubing (Bloom)”, “Big Circle”, “Solution Tree”, “Working with Lego”.

To the question “What do you know about the functional literacy of primary school pupils?” and “Do you see a connection between the provision of personality-oriented learning and the formation of functional literacy in pupils?” no response was received, indicating a lack of awareness of future primary school teachers in these issues.

The answers received during the survey confirm that future primary school teachers are not aware of the essence of functional literacy, are not aware of its structure, do not realize the importance of functional literacy in the education of a successful personality. However, future teachers have methods of organizing person-centered learning, able to apply the latest techniques common in European educational institutions in working with pupils of primary school.

The next task we propose to rank the main components of functional literacy, which should be formed in pupils, according to the degree of significance. To do this, we placed 10 components of functional literacy identified by

**Table 2.** The results of ranking according to the degree of importance of the main components of functional literacy, which should be formed in pupils

No.	Component of functional literacy	Rating place
1	orientation in the environment in accordance with accepted values, expectations and interests	5
2	the ability to make decisions independently and take responsibility in a situation of choice	6
3	the ability to be responsible for decisions made, as well as to be responsible for their family members	7
4	formation of the ability to learn and readiness for constant self-improvement	3
5	ability to easily navigate in unusual situations	4
6	adaptability to society and the ability to influence it	8
7	the ability to compromise and make a joint (collegial) decision	9
8	tolerance	10
9	perfect command of oral and written speech as a means of interpersonal interaction	2
10	possession of modern information and communication technologies	1

3. *Functionally literate person is able to be responsible for the decisions made, as well as be responsible for their family members.*
4. *The formation of the ability to learn and readiness for continuous self-improvement is a characteristic feature of a functionally literate personality.*
5. *Functionally literate person is able to easily navigate in unusual situations.*
6. *One of the signs of functional literacy of the individual is adaptability to society and the ability to influence it.*
7. *A functionally literate person is characterized by the ability to compromise and make a collegial decision.*
8. *A functionally literate person is necessarily tolerant.*
9. *Perfect command of oral and written speech as a means of interpersonal interaction is inherent in a functionally literate personality.*
10. *An important quality of a functionally literate person is the possession of modern information and communication technologies.*

us in one column, and in the second we proposed to put a number that corresponds to the degree of significance of each component in the structure of functional literacy. The answers were distributed as follows (table 2).

From the data obtained in the table we can conclude that future primary school teachers stereotypically prioritize in person-centered learning and continue to give preference to digital skills, literate oral and written speech, and the ability to learn. However, they do not attach much importance to the important qualities of functionally literate pupils, which indicates a lack of understanding of this competence.

Also for diagnostics of readiness of future primary school teacher to formation of functional literacy at pupils we carried out testing of students of a final course specialty in 013 Primary Education of Bohdan Khmelnytsky National University of Cherkasy:

*Dear students! Please agree or disagree the following sentences by choosing one of the two suggested answers – “yes” or “no”:*

1. *Orientation in the environment in accordance with accepted values, expectations and interests is a sign of functional literacy of the individual.*
2. *The ability to make independent decisions and take responsibility in the situation of choice is important for the functional literacy of the individual.*

For each answer “yes” put 1 point, and for each answer “no” – 0 points. Add the points to get the amount. Interpretation of the obtained result: students, who received from 8 to 10 points, have a high level of functional literacy. Students, who received from 5 to 7 points, have a sufficient level of functional literacy. Students, who received from 1 to 4 points, have a medium level of functional literacy.

According to the results, 10% (6 respondents) future teachers received from 8 to 10 points, which indicates a high level of their readiness to form functional literacy of primary school pupils. They are well versed in information about the organization of personality-oriented learning, care about improving their methodological level, are able to show complete independence, listen to the advice of teachers, mentors, methodologists. They are well versed in the methods, tools and forms of organization of personality-oriented learning of primary school children, seek to diversify ways of pedagogical interaction, make efforts to provide comfortable conditions for all participants in the educational process. In addition, they have their own positive experience of personality-oriented learning of primary school children, ready to abandon stereotypes, in pedagogical interaction seek to overcome inertia, considerable attention is paid to the moral values of students, their personal qualities and social skills.

7% (4 respondents) future teachers received from 5 to 7 points, which indicates a sufficient level of their readiness to form functional literacy of primary school pupils. They have an idea of the organization of personality-oriented learning, ready to increase their methodological level, if necessary, seek advice from a methodologist, mentor. They have the methods, means and forms of organizing personality-oriented learning of primary school children, can use different methods of pedagogical interaction, but focus mainly on pupils’ achievement. They also



have a positive experience of personality-oriented learning of pupils, seek to move away from stereotypes, in pedagogical interaction are ready to overcome inertia, pay attention to the education of moral values of pupils, their personal qualities and social skills.

The remaining future teachers – 83% (54 respondents) received from 1 to 4 points, which indicates the medium level of their readiness to form functional literacy of primary school pupils. They are familiar with the organization of personality-oriented learning, but do not rush to change the style of interaction with pupils, care about their methodological level, but do not always listen to the advice of teachers-mentors. They can use certain methods, tools and forms of organization of personality-oriented learning of primary school pupils', however, in pedagogical interaction they prefer methods of control over pupils educational activities. They also have experience in personality-oriented learning of pupils, although they are in no hurry to abandon stereotypes, so they are inert in pedagogical interaction, take on most of the authority, do not always pay attention to the moral values of pupils, their personal qualities and social skills.

Research and experimental work on the diagnosis of the readiness of the future primary school teacher to form the functional literacy of pupils by means of personality-oriented learning is organized in accordance with the previously developed program, which provides: the purpose and objectives of the experiment; place and time of the experiment, its scope; characteristics of the participants of the experiment; description of materials to be used in the experiment; step-by-step course of the experiment; methods of monitoring the progress of the experiment; description of the method of processing the results of the experiment; description of the method of interpretation of the experimental results. To establish the levels of readiness of future primary school teachers to form functional literacy of pupils by means of personality-oriented learning, we identified gnostic, operational and behavioral criteria and corresponding indicators, which allowed respondents to find high, sufficient and medium levels of readiness.

According to the results of questionnaires and testing, 10% (6 respondents) future teachers have a high level of readiness for the formation of functional literacy of primary school pupils, 7% (4 respondents) – sufficient level i 83% (54 respondents) – medium level. The ranking of the components of functional competence by future primary school teachers confirms that they stereotypically prioritize personality-oriented learning and continue to give priority to digital skills, literate oral and written speech, and the ability to learn. However, they do not attach much importance to the important qualities of a functionally literate child, which indicates their lack of understanding of this competence.

The obtained results are taken into account when updating the curriculum for bachelors majoring in 013 Primary Education. For this purpose, a special course “New Ukrainian school: components, methods, competencies” was additionally introduced, the content of which was expanded with practically oriented material, acquaintance with which will allow to effectively form the following

components of functional literacy in pupils: orientation in the environment in accordance with accepted values, expectations and interests; formation of ability to learn and readiness for constant self-improvement; perfect command of oral and written speech as a means of interpersonal interaction; possession of modern information and communication technologies.

The introduction of the elective course “Tolerance and non-discrimination in the educational environment” will help future primary school teachers to develop tolerance, as well as the ability to compromise and make joint (collegial) decisions. Studying the elective course “Gender Pedagogy” involves developing in them the ability to be responsible for the decisions made, as well as to be responsible for their family members. Mastering the elective course “Pedagogy of Equal Opportunities” will form the ability of future teachers to make decisions independently and take responsibility in the situation of choice. We also updated the content of syllabus from the disciplines “Theory and methods of education in primary school”, “Didactics and school science”, “Introduction to the specialty “Primary education”. This will allow future primary school teachers to develop such components of functional literacy as the ability to easily navigate in non-standard situations, as well as adaptability to society and the ability to influence it.

## 5 Conclusions

The study confirms the achievement of this goal – the attitude of future primary school teachers to the need for the formation of functional literacy in pupils. For the first time we have established the dependence of the formation of functional literacy of pupils on the use of personality-oriented learning – learning based on the recognition of individuality, identity, self-worth of each child, its development as an individual endowed with unique subjective experience. It was found that compared to the previous century, when the first attempts were made to implement humanistic learning, pedagogy of cooperation, at the beginning of the new millennium, the implementation of the content of personality-oriented learning is determined by the project method, interactive interaction method, portfolio method, research method and other methods.

According to the goal, a number of tasks have been solved. Thus, the essence of the concept of “functional literacy” is specified as the ability of an individual to apply all lifelong knowledge, skills and abilities to solve the widest possible range of life tasks in various fields of activity, communication and social relations.

It is analyzed that the structure of functional literacy includes 10 components (orientation in the environment in accordance with accepted values, expectations and interests; ability to make independent decisions and take responsibility in a situation of choice; the ability to be responsible for decisions made, as well as to be responsible for family members; formation of ability to learn and readiness for constant self-improvement; ability to easily navigate in unusual situations; adaptability to society and the ability to influence it; ability to compromise and make

a joint (collegial) decision; tolerance; perfect command of oral and written speech as a means of interpersonal interaction; possession of modern information and communication technologies). In terms of content, these components are close to soft skills, and their formation in early school age will affect the successful socialization of children to environmental conditions.

In the course of the research we determined the attitude of parents of pupils to the need to form functional literacy. It was found that parents strive to see their children successful in the modern world, to have formed the will and character, to be able to adequately socialize, to constantly improve throughout life.

The diagnosis of the formation of functional literacy in future primary school teachers confirms, that only 10% of them (6 respondents) have a high level of readiness for the formation of functional literacy of pupils, 7% (4 respondents) – a sufficient level and 83% (54 respondents) – an average level. The ranking of the components of functional competence by future primary school teachers shows that they stereotypically prioritize in personality-oriented learning and continue to give preference to digital skills, literate oral and written speech, the ability to learn. However, future teachers do not attach much importance to the important qualities of a functionally literate child, which indicates that they lack an understanding of this competence.

The research conducted here does not exhaust the solution of the chosen problem. Forms and methods of training of future primary school teachers for the formation of functional literacy in pupils need further research. The most optimal conditions for training of future teachers for the formation of functional literacy in pupils need to be developed.

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## The factors of professional training of a primary school teacher in the context of the second graduate degree in Pedagogy

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**Abstract.** The article highlights the problem of effective education of adults receiving the second graduate degree in Pedagogy. The importance of this problem is related to the specifics of the formation of the contingent of part-time students majoring in 013 Primary education, which is heterogeneous in age, basic education, and professional activity. The study used the method of questionnaires, interviews, observation of the educational process, methods of quantitative mathematical analysis of data processing. The normative-legal base in the context of the research is analyzed; the comparative analysis of the system of teacher training in a number of European countries is carried out. It was found that in the process of professional training of primary school teachers in the second graduate degree should take into account the following factors: age of students, their needs, social status, the availability of main education, and work due to the specialty. This determines the selection of methods and techniques of teaching, technologies that provide quality practical training, taking into account their professional and life experience, intrinsic motivation and a strong desire for self-realization. The study identified the most important principles of andragogy, which should be based on professional training of students receiving second graduate degree in pedagogic, specifically: priorities of self-study, organization of group work, use of professional experience as a source of new knowledge, relevance of knowledge and experience, self-motivation. This made it possible to identify the priority forms of organization of the educational process, to provide a practical component of the formation of subject and methodological competencies of the modern primary school teacher.

### 1 Introduction

Modernization of the higher education system in Ukraine in modern conditions is caused by the increasing role of the individual who adapts to rapid changes in social and economic life. Over the last decade, the requirements for the professional competence of a graduate of a higher education institution, the degree of his readiness for continuous personal and professional development and self-improvement have significantly increased. To start with, modern social and cultural trends determine the transformation of higher education into a social mechanism of personal development; moreover, these trends focus on training a specialist who can adequately accept the challenges of a society and establish the direction of further activity.

According to observations, the most people choose their profession in a high school, but by no means have all of them then work within their specialty. The final choice of the profession person would like to work and get better in, proceeds commonly in a mature age. In order to acquire a new profession, some specialists get a non-formal education, complete short-term or long-term retraining courses, get certified in retraining programs, engage in self-education or undergo the professional certifi-

cation. Others enter higher education institutions. This is just the one of the reasons that stimulates a person to get a second graduate degree.

It often happens that the obtained specialty gets actual in a few years due to redistribution processes in the job market, new tendencies in social requests for the certain professions (staff resource redeployment in economics). As a result, there is a reduction in job opportunities and wages. Those who want to be successful and stay in demand, have to change their profession, risk and start all over again. Therefore, today more and more people are mastering new fields of knowledge, getting a second graduate degree and as a result get new specialty. And this is not only the characteristic property of the Ukrainian labor market, but a global trend generated by the bursting society development in the 21st century.

Second graduate degree is an education obtained through the specialized training. Its destination is the improvement of professional skills of a person, expanding and updating his professional knowledge, skills and abilities or obtaining the other specialty on the basis of main education (educational qualification level) and practical experience as a specialist with bachelor's or master's degree. Form of study – full-time or part-time (as the candidate selected) [1].

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Thus, demographic leaps, the availability of vacancies, new vacancies lead up to learning throughout the person's life, the intent and necessity to change proficiency's and professions. Based on expert estimates, the number of candidates seeking for a second graduate degree is growing by 20-30% annually. This dynamic is unchanged since 2004 to the present. More than 55% of "adult students" do not improve proficiency, but receive completely different profession. Such trend is nurtured by the presence of the new specialties in the labor market and the current educational trend of "Lifelong Learning" [2, 3].

The goals of the article are the identification of factors of effective education of adults receiving the second graduate degree in Pedagogy.

## 2 What the law says?

The Law of Ukraine "On Higher Education" (as amended on September 25, 2020) states that no one may be restricted in the right to receive the higher education (Section I, Article 4). Citizens of Ukraine have the right to obtain a second graduate degree free of charge due to the loss of the opportunity to perform official duties according to main education based on the conclusions of the medical and social expert commission [4]. Persons who have obtained the specialist educational and qualification level at the expense of the state budget may obtain a master's degree only at the expense of individuals. The Order of the Ministry of Education and Science of Ukraine "On Approval of the Conditions of Admission to Higher Education Institutions of Ukraine" establishes the rules of admission for persons entering on the basis of a previously obtained main education. There are no age restrictions on obtaining a second graduate degree in accordance with current legislation. However, some institutions of higher education set a 35-45-year age limit depending on the features of the specialty.

## 3 The reasons to choose the second graduate degree in Pedagogy

Today the pedagogical education in the labor market in Ukraine is one of the highly requested among employers. The demand for high-quality educational services is growing every year – modern private educational and development centers are opening. The majority of them provide the development and education of children at preschool and primary education. Graduates who obtain a high-quality second graduate degree in the specialty 013 Primary education have the ability to work not only as teachers but also as correctional and rehabilitation teachers, mythologists in innovative educational centers, inspectors in children social protection authorities, online academies, etc. The teaching is also providing a career growth – in time it is possible to take the position of deputy headmaster or headmaster, go through the system of teacher training and obtain the pedagogical title of "school counselor". Quite a few masters' graduates, who have successfully mastered the educational program of professional training, are employed abroad and have a significant success.

## 4 Current practice of teacher training in the Europeans educational system

In some countries, second graduate degree is similar to the optional professional course. Due to this condition, anyone can receive a pedagogical education by completing a shortened training program.

Higher pedagogical system in Poland is represented by a number of institutions (universities, higher pedagogical schools and pedagogical academies, as well as academies of physical education), where those who is interested in can obtain a second graduate degree (specialization) after a two-year retraining program [5]. According to the provisions of the law on education "Karta Nauczyciela", five stages of teacher professional development have been established. At the initial level, it is a "trainee" who teaches in educational institutions for one or two years. After a successful interview with representatives of the educational commission consisting of a mentor, headmaster, head of the pedagogical department of the higher education institution and a trade union representative, the trainee moves to the level of "contract teacher". In this position, the teacher must work at least three years. The next step is to pass a methodical exam, which gives the opportunity to improve the professional qualification to the level of "nominated teacher". In this position, the teacher must work for three years and re-interview with representatives of the educational commission. According to The Polish Education Act now the commission includes: the director of an educational institution or a deputy director, three experts from the Ministry of Education and a trade union representative. The fourth level is a "certified teacher". For the most Polish teachers it is final step in professional development. However, some professionals are trying to reach the fifth level – "professor of education".

In Germany, the procedure for obtaining a second graduate degree, or *Zweitstudium*, is no different from the obtaining of the main education. Students study together with those who receive a bachelor's degree for the first time. In such circumstances, the study of professional disciplines takes place at an in-depth level, which means full immersion in the specialty: the opportunity to attend a full lecture course, participate in seminars and workshops, as well as practice in educational institutions on a paid basis [6]. Another advantage of the second graduate degree in Germany is a flexibility of education system, which is implemented in a mixed form. The basic professional training of teachers represents in two stages: a period of practical training at the university and practical training at school. Teacher training programs are provided by the following universities: Technische Hochschulen / Technische Universitäten, Pädagogische Hochschulen (pedagogical colleges). Recently, the percent of active pedagogical school practice related to the courses of higher education has been increasing in the respective training program. In each state teacher training centers are founded that form the chain between higher education institutions and the school in order to ensure the quality of students' pedagogical practice.



The teacher training system in the UK is quite flexible. To become a teacher, you can enroll in courses or a series of courses for students at a university that provides a teacher education. The educational programs of the courses are structured in such a way that allows a student to combine studying and work activities.

To have a right to work in public educational institutions, it is necessary for the job applicant to acquire the level a “qualified teacher status” (QTS). To obtain a QTS, you must have a bachelor’s degree or an equivalent qualification. In addition, it is mandatory to pass certification for compliance with the professional standards [7].

The UK university teacher-training program includes three components that are close correlated and provide both the basic educational concepts as well as the practical skills needed for successful professional growth. The curriculum addresses all aspects of teacher training, including the development of subject planning skills, teaching, assessment of student achievement, and classroom management. Students under the guidance of university academicians carry out educational and professional research in order to develop and implement modern learning technologies in the educational process. The third component is the pedagogical practice; students go through it in partner schools to train professional competencies [8].

In Finland, there are various teacher-training programs in the higher education system – primary school teachers (grades 1-6) and subject teachers, who provide teaching of different subjects in grades 7-9. For a long time, the primary school teacher is constantly one of the most popular professions. Every year, a large number of entrants (up to 7,000 people) who have graduated from high school with honors, seek education in educational programs for primary school teachers [9]. In order to become a teacher (both elementary school and subject teacher), you must obtain a master’s degree. The duration of relevant university courses is 5 years. Today, the development of the practical skills is the basis of practical training of teachers at the university that helps forward to the extension of professional competencies. Active pedagogical practice starts in the first year of study and provides a combination of theory and practical proficiency. During this period, students observe the activities of teachers and students in the educational process; carry out psychological and pedagogical analysis. During the second and third years of study, students teach all alone, assess trainee achievement and perform the duties of a class teacher. In the fourth year of study, students are participating in meetings of methodological associations of teachers, in the preparation of school activities. While they overcome the difficulties that arise when combining theory with practice, they create their own professional portfolio and fill in reflective learning logs. The portfolio and the reflective study journal are constantly reviewed by the teacher-supervisor of the practice. Then on the basis of it the practical professional activity of students is adjusted. Thus, students are aware of how modern concepts of learning are implemented in the educational process of the school. The management of pedagogical practice is carried out by university academicians and school teachers. Implementation of the inno-

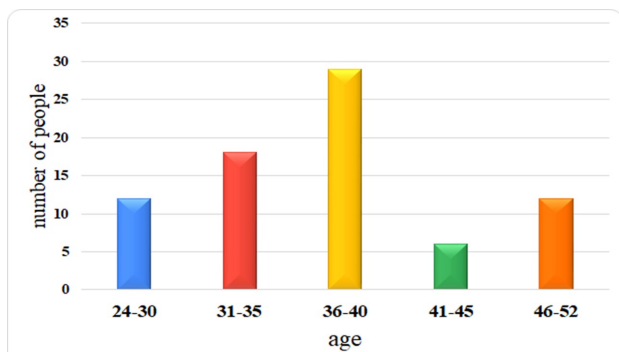
vatve approach provides conditions for systemic innovative changes in the activities of such institutions aimed at its development and improvement, promotes the introduction of new content and forms of management, integrated methods, information and communication, and interactive technologies of teaching and educating students, building a modern management structure, improves organizational and professional culture. The application of competence and personality-oriented approaches to the management of such educational institutions based on innovative technologies reflect the interconnected innovative individual activities of management entities, identify socially significant positions of the individual in the team, taking into account not only professional requirements but also personal needs of each participant.

It is worth noting that today in the European educational system, there are similar models of higher pedagogical education, and special attention is focused on practical training.

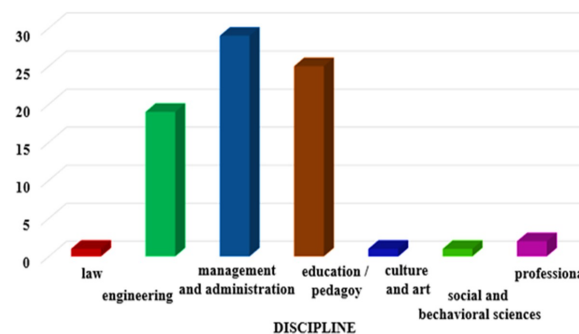
## **5 The special aspects of adult education**

Today in Ukraine, the strict attention is paid to the development and implementation of an effective policy of adult education and training; such a policy is needed due to the number of reasons. One of the important factors is the Ukraine’s entry into the European educational field. This involves the development of all components of the system of Lifelong Learning. Lifelong learning is a tool that ensures the modernization of the economic, social and humanitarian sphere of the country. Adult education provides for the usage of all education forms on all levels, which allow adults who have a main education to acquire new competencies or enhance professional knowledge and skills. According to the definition of the European Association for Adult Education (EAEA), the segment of “adult education and training” in European practice covers formal, non-formal and spontaneous forms of adult education [10, 11]. The second reason is the year-on-year growth of demand for adult education providers. In the field of education for adults, Ukraine is endowed with a number of international instruments, unilateral and bilateral agreements, which outline certain issues of adult education, especially, such international instruments as the Incheon Declaration and Framework for Action [12]; Sustainable Development Goals to 2030, SDG 4 in the Final Document of the UN Summit “Transforming our world: an agenda for sustainable development until 2030” (adopted in 2015 and ratified by Ukraine in 2016) [13]; Priorities of the Eastern Partnership until 2020 [14]; Hamburg Declaration of UNESCO, 1997 [15]; Association Agreement between the European Union and Ukraine [16].

The Law of Ukraine “On Education” (as amended on 16.11.2020) in Article 18 states that adult education is a component of lifelong learning which aimed to the enforcement of the of every adult to lifelong learning, with respect to his/her personal needs, priorities of social development and the needs of the economy. The components of adult education are postgraduate education; professional training of employees; retraining or advanced training



**Figure 1.** Age characteristics of respondents



**Figure 2.** The first education of respondents by the field of knowledge

courses; continuous professional development; any other components provided by the legislation, offered by the subject of educational activity or defined by the person [4].

In order to determine the specific aspects of professional training of primary school teachers who receive a second graduate degree in Pedagogy, we conducted a study of a student quota who have chosen the specialty 013 Primary Education of Kryvyi Rih State Pedagogical University (external study mode) and graduated the university with bachelor and master degree over the last two years. To collect experimental data, a Google form of a questionnaire was developed, which provides clarification of issues related to rethinking approaches to training. 77 respondents took part in the research. The following parameters were analyzed: age, basic education, level of education, availability of practical experience in the second specialty in general secondary education institutions, advantages and difficulties that appeared in the process of obtaining a second graduate degree.

Analyzing the age characteristics of the respondents, we found that 12 students are aged 24-30 years, which is 15.6%, 18 students aged 31-35 years (23.4%), 29 students aged 36-40 years (37.6%), and only 6 students aged 41-45 years (7.8%), and 12 students aged 46-52 years (15.6%). Thus, most of them (37.6%) are aged 36-40 years (figure 1).

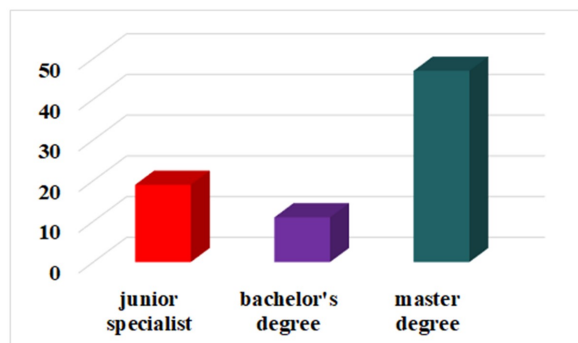
At this age is the time for midlife crisis, critical assessment and reinterpretation of life positions, there is common dissatisfaction in the professional and family life, the maturity comes that forces to changes, to acquire another education, profession [17–21]. This encourages a person to finally realize a child’s dream, to get rid of the state of unrealisation. This thesis is confirmed by the results of interviews with respondents, among whom 46 (59.7%) indicated that they came to get a second graduate degree in pedagogic because of the aspiration, which is the strongest motivating factor in learning.

Most studies show that adults obtain a second graduate degree mainly due to the redistribution of the labor market, job loss. According to our data, this percentage is only 10 (7.7%). However, our study found another trend that few people talk about. In addition, it is mainly related to the personal needs of higher education students, their mental state.

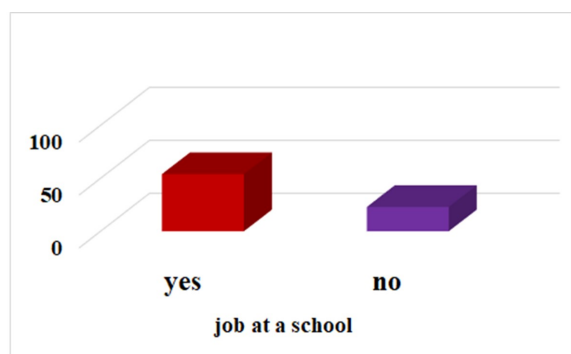
Basically, according to the analysis of the age-related characteristics of the respondents, it is clear that the maximum age of the students is 52 years. The average age of those who obtain a second graduate degree in pedagogic is 35.2 years. Adult students are anxious about decrease in memory and mental activity. According to the respondents, it is difficult for them to assimilate and memorize a large amount of new material, professional terminology, which has a negative impact on educational and professional activities. This should be taken into account when appropriate teaching methods and technologies are selected. It is also important to keep in mind the fact that adult students obviously have children, feel responsibility for their own lives and the environment. Considering the age characteristics of the student contingent, we think, it would make sense to offer them a flexible system of education, the ways to organize self-education and mutual education.

To find out how the contingent of students who obtain the second graduate degree is formed, we analyzed the main education obtained by them in the fields of knowledge (figure 2).

The analysis of the student’s answers testifies that students seeking for the second graduate degree in the specialty 013 Primary education, previously had such professions as: 1 law (1.3%), 19 engineers (24.9%), 29 were specialists in management and administration (34.7%), 25 students had basic pedagogical education (32.9%), 2 students (2.6%) had a degree in culture and art, 1 respondent (1.3%) represented such area of knowledge as social and behavioral sciences and professional. So, most of them have basic economic, pedagogical and technical education. A specific of the specialty 013 Primary education allows you to successfully use the knowledge of the previous profession and implement those skills in the second specialty. For example, one respondent claims, “after my main education, I am a marketing expert, which allows me to offer students a variety of creative ways to present educational material. The main task of the teacher is to interest the children, motivate them to learn, to reveal the relevance and importance of information, to make the learning process accessible”.



**Figure 3.** The first education of respondents by the field of knowledge



**Figure 4.** Employment according to the second education

The next criterion for the analysis was the level of the main education (figure 3). The analysis of the personal data shows that 47 of respondents have master's degree, which is 61.2%. Respectively, 11 (14.2%) students have a bachelor's degree and 19 (24.6%) have junior specialist degree.

According to observations of the educational process and interviews with applicants for second graduate degree, the most successful students are those with a basic higher education and a master's degree. They usually able to rank data quickly know well how to work with literature, interpret it, draw conclusions, have strong skills of critical thinking and communication, self-education and self-organization. Students with a basic degree of junior specialist are less successful in their studies, because they do not always own the techniques of effective information processing, skills in working with literature. This criterion, in our opinion, should be considered when the educational process is organized.

An important factor is the availability of practical experience in the second specialty (figure 4). According to our surveys, 54 students (70.1%) work according to their specialty. They thirst for knowledge, study with interest, show activity, rethink their own pedagogical experience, share their failures and achievements, give useful practical advice to classmates.

Thus, age, practical experience, higher education or even several educations, including pedagogical, require fundamentally new approaches to learn, because adults

learn differently when motivated by professional needs in the acquisition of subject and methodological competencies. At the same time, we have to overcome a number of difficulties related to stereotypes about forms, educational environment, activities, assessment and self-assessment, etc.

The development and implementation of adult education policies is a challenge of the present time, which is becoming increasingly important in an era of rapid digitization and a dynamic change on labor market. Adults (those who have practical experience, hold certain positions) need to update constantly their knowledge in order to meet the demands of employers. Accordingly, a new direction is founded in pedagogical science, which reveals the problems, prospects, features of adult education throughout life – andragogy.

Modern andragogy distinguishes 11 defining principles (provisions) that must be considered during the planning and conducting of training sessions [22, 23]. We think that it is important to consider the five most important of them in the process of training students who receive a second graduate degree in pedagogic in the specialty 013 Primary Education.

The first principle is the priority of self-study. This means that in order to develop the theoretical part of the discipline, it is necessary to develop a research framework (guide) for students with appropriate practical tools for its processing.

The second principle is the organization of a group work. As practice shows, cases for practical work should be offered to students to perform in groups. This in turn leads to increased levels in communication, provides the exchange of professional experience and significantly improves the quality of their performance, as well as the preparation for exams.

The use of professional experience as a source of new knowledge is the third important principle that ensures the exchange of experience, the transfer of information to each other and the production of new ideas in the discussion. Therefore, during the lectures and practical classes it is important to use discussions with problematic topics that actuate a critical rethinking of the implementation of modern pedagogical concepts, technologies and techniques. In addition, it is advisable to introduce intersessions consultations in order to implement independent project tasks more effectively.

Andragogs also highlight the principle of relevance of knowledge and experience. Therefore, in the classes it is advisable to consider the cases of students, with which you can explain the mistakes and suggest effective ways to solve them.

An important principle of adult education is self-motivation. This principle allows students to choose the topic on which they develop their own projects for independent work, work on course, bachelor's and master's studies.

## 6 Conclusions

To conclude, we emphasized that's learning of adult students should take place through the understanding of their own professional and life experience, considering their age, main education, personal needs.

It was determined the key factors of professional training of a primary school teacher: age of students, their needs, social status, the availability of main education, and work due to the specialty. This determines the selection of effective practical methods and techniques of teaching, technologies that provide quality training for forming them professional skills and competences.

Acquisition of the second graduate degree in pedagogic should be based on the principles of andragogy, such as the transformation of experience, its rethinking, with the attention to the analysis of practice-oriented cases, pedagogical situations, collaboration, integration of knowledge from the main and the second graduate degree, experience. The organization of such training should be flexible, to use distance and mixed form of learning. An important aspect is the assimilation of specific terminology, improving the culture of professional speech.

The process of professional training of primary school teachers in the context of the second graduate degree in Pedagogy, it is important to ensure a practice-oriented approach, flexible learning, involvement of professional communities of responsible teaching, non-formal and informal education. In addition, professional training should include the formation of skills to choose quality educational content, develop educational programs, plan the educational process, and ensure the system and manufacturability of education.

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## Communicative management in present-day university

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**Abstract.** In modern academic community not only communication management plays a great role. Monitoring of expectations, awareness of communicative needs, the course and results of communicative interaction, barriers hindering rational managerial decisions are also of large importance. Everything done by participants of the learning process to solve strategic and tactical tasks of a university development requires an effective exchange of information. The main prerequisite for the effective business communication is the understanding that the possibility to achieve the goals of interaction increases if it is properly organized, if an atmosphere of mutual understanding, trust and cooperation is created. In present-day conditions, university managers must have communicative, managerial competencies, knowledge of communication theory and applied approaches to the process of its implementation. Mastering the skills of communicative influence contributes to the formation of a positive image of an institution and helps to achieve educational goals. While monitoring communicative management at Ternopil Volodymyr Hnatiuk National Pedagogical University, we have revealed the students' deep understanding of its essence, opportunities, mechanisms, and practice of implementation in the academic community. Communicative management resources provide effective management decisions and create a comfortable academic setting to meet the needs of all participants in the learning process.

### 1 Introduction

Communication is one of the prerequisites for successful management of a modern university, the process of continuous exchange of information, the mechanism of effective decision-making and communication between the subjects of internal and external settings. The role of communicative management in the academic setting lies in the interaction of all participants in the learning process, information being the main resource and communication its technology. Nowadays, communicative management in higher education has a more formal, declarative expression, despite a large number of theoretical and practical research and study aids. On the other hand, academic institutions, now competing fiercely in the market of educational services, are aware of their powers and functions, adapt business management experience to their specifics, try to use communication opportunities as a real resource and, accordingly, look for optimal ways to manage them. The essence of communicative management in the learning setting lies in implementing a purposeful, reasonable and informative influence of the subject on the object, making management decisions, mastering quality methods and tools [1].

The relevance of the study subjects to the need to justify the importance and pragmatic role of communication in management processes, rational decision-making, establishing a productive balance in the present-day academic setting. Approaches developed by the theory of

communication require careful analysis to focus on effective communication traditions, mechanisms, strategies and tactics, overcoming stereotypes about communication at a university. The purpose of the article is to demonstrate the essence of communicative management, to substantiate the peculiarities of its development in the academic setting as well as to describe on the basis of practical research (experiment) the modern vision of participants of the educational process the dynamics and prospects of communicative management in a present-day university.

### 2 Communicative management in the scope of strategies and prospects of a university development

The systematically organized communication process allows to ensure the coordinated work of all structural units of a university, to improve communication skills, to overcome communication barriers in the process of management functions optimization. Management functions are relatively separate areas of management allowing you to influence the management object to achieve the goal. A. Fayol, one of the founders of the management theory, distinguished the following management functions: planning, organization, motivation, coordination and control [2].

In the communicative management these basic functions include:

- definition of communication goals and ways to achieve them;

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- organization of communicative actions;
- motivation for communicative collaboration;
- coordination of interaction of all participants of the learning process;
- control over the course of professional communication;
- adjustment of its results.

Thus, communicative management is a professional activity aimed at achieving effective communication within the university as well as with the external setting through the implementation of communication policy. Communication policy involves defining the goals of communication, ways to achieve them, the content of information, and the quality of feedback.

Conceptual, communicative and managerial competencies are the basis of communicative management in the academic setting. The conceptual competence involves generation and implementation of ideas, approaches, management models and peculiarities of their development, analysis of factors influencing the formation of the communication system at a university. By the communicative competence we mean language proficiency that allows you to successfully solve the basic tasks of communication, the use of appropriate techniques relevant to a particular communicative situation. These are also strategies of behavior in academic interaction allowing you to build effective communication in accordance with the goals and conditions of professional and interpersonal interaction and requests for self-development. The basis of managerial competence is formed by knowledge of management theories, its laws and principles, the implementation of classical and modern (innovative) functions of managing the learning process at a university, mastering the technology of management decisions [3].

A present-day university setting in Ukraine requires from its authority, teachers, and students to develop advanced communication skills that not only reflect the level of communicative competence and ensure the psychological security of the team, but also present the communication culture of the institution as a whole. Communicative management, as well as other spheres of functional management, arises from the purpose and strategy of the university development, is realized in tactical decisions, has its own aims and programs. Communicative management explores the prospects of a university, creates the most effective levers of its influence as a whole, taking into account the nature of its functioning in the higher education system, and short- and long-term management decisions.

When it comes to communicative management in the academic setting, it should be understood that in different situations all participants of the learning process can be the subject of management:

- a student: while performing public duties as a monitor of the group, a head of the student government; during the teaching internship in secondary or higher educational institutions etc.;
- a lecturer as a person who organizes the learning process within a particular course and the upbringing process, monitors and adjusts its course and results; as a

guarantor of the programme of study taking into account modern requirements for the quality of education and correlating the work of stakeholders, a support group, students, etc.;

- an university authorities: each head of the structural unit (heads of departments, deans), vice-rectors and the rector perform the roles of managers at different levels, ensuring the coordinated work of micro-teams to achieve optimal corporate results – to provide high-quality educational services.

R. Savolainen distinguishes between the issues of information exchange and knowledge exchange considering “information sharing and knowledge as modes of human activity” [4]. These considerations should be taken into account in our further researches on the peculiarities of communication in academia, where information is a resource, and knowledge is a result.

Business communication in the academic setting takes place according to its own rules and laws determined by the mission and pragmatic tasks of modern universities. Nowadays, this type of communication in Ukraine is undergoing rethinking and transformation due to a number of factors:

- education reform;
- relative autonomy of universities;
- penetration of certain business laws (including the laws of communication in this area) into the academic setting;
- relative weakening of conservatism, stereotyped academic communication.

The theory and practice of public communication have developed many approaches and concepts that interpret individual, group and mass communication depending on the characteristic features of participants, environment, goals and objectives of communication etc [5]. We attempted to adjust their relevance to the peculiarities of communication management in academia, considering specific features of participants of the communicative process, education managers’ expectations and a university mission in general.

G. Morgan notes that productivity, accuracy and efficiency are the most valuable qualities of such characteristics which are expected from a well-designed, coordinated mechanism. Morgan uses the metaphor of a mechanism, as it reveals important parallels between mechanical devices and how managers traditionally think about their organizations [6]. According to the classical theory of management, lecturers in higher educational institutions are seen as cogs in huge university mechanisms that function harmoniously when algorithms are laid down, the range of their movement is clearly defined, actions are worked out and motivated by appropriate incentives (salary, bonuses, honors, etc.). Lecturers (“mechanisms” in other words) obtain academic degrees according to the established scheme, perform repetitive tasks, teach the same disciplines, hone the evaluation mechanism according to the same scale, prepare students according to the

established algorithm. Finally, a university can be seen as an integral part of the country's educational mechanism, and educators at every level feel most at ease when it is run as a whole.

K. Weick believes that innovation is hindered or prevented by hierarchical structures, the dominance of team communication, and standardized work procedures. According to the scholar, a present-day university as a living organism in order to survive must constantly adapt to changing conditions (reforms, political conditions, labor market requirements etc.). We agree with the researcher's view that organizations survive and prosper only when communication between their members is interactive and constitutes a free exchange of information [7].

The cultural approach to communication requires a serious attitude to the language of representatives of the academic setting, careful analysis of direct and contextual meanings and subtexts to find a common to all participants meaning that underlies any organization, such as "teaching as I live", "educational mission", "teacher is forever", "teach with love", "I learn by teaching". For example, in M. Pacanowsky and N. O'Donnell-Trujillo's understanding, culture is not what the organization has, but what the organization is [8].

In his critical theory of communication, S. Deetz criticizes managers' excessive concern about providing control as the best way to reduce costs and increase efficiency. How does it work in academia? University management control in action is well illustrated by various types of formalized reporting (on research, career guidance, educational and other activities), the creation of which works little in the interests of students. A unity (formation) is created in which many people live, but few have the right to vote on the structure of the company or the decisions it makes. Of great interest is S. Deetz's opinion of destructive role of "managerialism" in the organization, which he defines as a systematic logic, a set of routine practices, and ideology that values control over all other concerns [9]. The value of the scholar's views lies in his departure from the philosophy of total control in the organization. Instead, he suggested the concept of decision-making as an open dialogue of all stakeholders. Deetz calls this practice codetermination. Considering a constructive view of communication, codetermination, according to S. Deetz, represents "collaborative constructions of self, other, and the world" [10].

The core of this process is communication as necessary condition of this activity and the way to implement the needs of the subjects in each other.

Hence, the interaction of the subjects of the educational process is an integrity that is demonstrated simultaneously as the unity of opposite types of relationship (subject-subject, subject-object), opposite types of content exchange (spiritual and practical), opposite ways of exchange (activity and communication).

R. Hirokawa and D. Gouran examine management as a permanent interaction representatives of this direction, believe that interaction in the team, where everyone is interested in high performance and at the same time has their

own conceptual vision, factual material, ideas, decision mechanisms etc, positively affects the final outcome [11].

Interaction of participants of the learning process is understood as a multifaceted phenomenon, namely:

- social – it is characterized by the implementation of objectively existing connections of participants of the learning process with the outside world;
- psychological – it is characterized by a process of mutual understanding, empathy, cooperation;
- pedagogical – specially organized, purposeful processes, as a result of which participants of interaction undergo positive transformations.

This interaction of participants of the learning process should be a holistic open system with its own structure, external and internal relations, a set of certain functions, including management. This system contains subjective, content-target, organizational and effective components. Its openness is ensured by connections with other pedagogical and social systems.

The following criteria that determine the effectiveness of pedagogical interaction can be distinguished:

- the learning process participants' readiness;
- openness to interaction with each other in the academic environment;
- positive interdependence of participants of interpersonal interaction (awareness of a common goal, availability of resources, joint efforts to solve problems);
- the right of every participant of interaction to authenticity;
- awareness of individual and group responsibility (participants' internal and external motivation to joint activities);
- the ability to meet basic interpersonal needs in the process of joint activities and communication;
- supportive interaction, which provides a favorable psychological climate of interaction;
- highly developed social and communication skills;
- reflexive analysis of one's own behavior as compared to social behavior of other participants, etc.

These criteria of interaction help to create necessary prerequisites that would promote the formation of partnership between participants in the learning process, help managers of educational institutions establish effective communication in the academic environment.

The content of interaction is revealed both at the level of individual contacts and in the context of common activities. The content of the relationship between the participants of the common activity is the correlation of the individual contribution of each of the participants to the common issue. The pedagogical process is the process in which social ideas are transformed into personality qualities.

The main features of joint activities in the academic environment are:

- common goals of participants of interaction (joint activities which consist in achieving goals that are not available or partially achievable to an individual);
- joint activities are appropriate when conscious goals are set in advance);
- participants of joint activities, besides individual motives, must have motivation to work together, i.e. to form general motivation to achieve a goal;
- distribution of roles between participants of interaction;
- combining of individual and group activities, coordinated implementation of distributed and combined individual activities of all participants;
- need for management and self-management;
- a single result common to all participants.

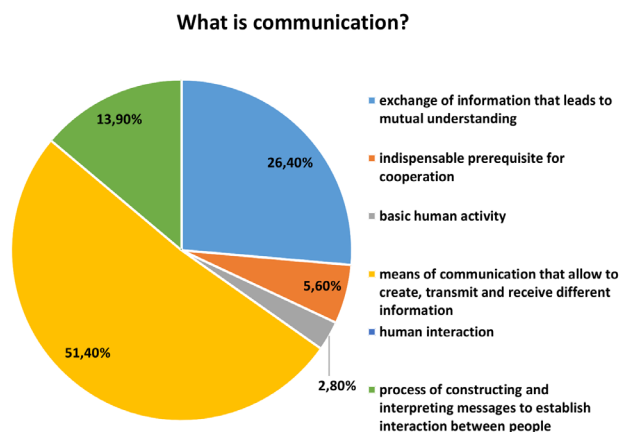
Different views on communicative management prove that due to the academic, communicative and managerial culture of students, teachers, managers, interaction in the academic environment becomes effective.

Different forms of communication in academia (telephone conversations, meetings, conversations, business negotiations etc.) are effective under the condition of the implementation of basic communication and management skills: the ability to make a convincing impression, to speak, to listen, to use nonverbal means. Moreover, in formal (provided by the management model) as well as informal (interpersonal) communication, the implementation of these skills is important for the implementation of management tasks in the field of education. The study of the peculiarities of communication in the academia shows the existence of a number of barriers to communication. They lead to the decrease in the efficiency of the communicative process and at the same time catalyze the search for optimal models of interaction. The most notable barriers are the following: misunderstanding of the importance of the message; incorrect setting of consciousness; errors in wording the message; low persuasiveness; inability to control oneself.

The educational environment should create prerequisites for self-realization and communication, it should be aimed at ensuring that everyone can develop:

- the ability to think critically and speak independently;
- the ability to make independent decisions;
- the ability develop emotional intelligence;
- the ability form the self-awareness of each participant as a team member;
- the ability to promote the coordination of external needs and internal motives for self-development and self-realization of all participants in the educational process.

Properly established communication allows you to solve any task. This is not a pointless “chatter”, as skeptics of communication theory point out, a meaningless process that takes time and prevents the formulation of an unambiguous, individual solution. This is, rather, an opportunity for all members of the team to speak out in order to produce optimal, most rational solutions [12].



**Figure 1.** The students’ understanding of the concept of communication

### 3 Monitoring of the peculiarities of communicative management in the academic setting of a present-day university from students’ perspective

We conducted a survey in Ternopil Volodymyr Hnatiuk National Pedagogical University in which 623 respondents took part. It was aimed at discovering the level of understanding the processes underlying communicative management, participation in decision making and setting the university development strategies.

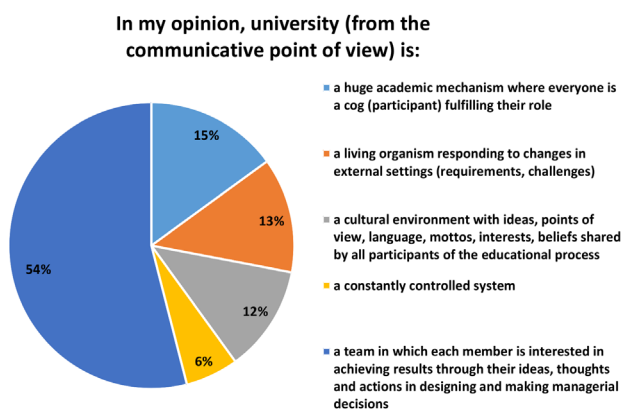
The research shows that respondents focus on the need for modern forms of communication in academic management processes.

Most respondents understand communication as a mechanism to transmit information, as well as to cooperate, collaborate and achieve common results (see figure 1).

In the students’ opinion, interpersonal contacts and interaction are the most productive ways of managerial communication in modern academia. This is natural, because attention to the educational needs of students is rather a request that has formed a student-centered approach – the philosophy of modern progressive universities.

It is quite bold and brave to interpret the university in terms of communication as a team in which each participant is interested in achieving results through the expression of their ideas, considerations and actions in designing and making management decisions. As we can see, the students demonstrate not only self-sufficiency, but also willingness to take responsibility for the organization of the learning process, try to be not passive but active participants and, most importantly, to influence management decisions through communication. On the other hand, it is comforting that the respondents are aware of the dynamics of the learning process, understand that it is an open, not a static system that responds to external and internal changes, thus constantly changing, updating and improving. The choice of the option “cultural setting” indicates a shift of emphasis from pragmatic to cultural, value aspects. In this we see the respondents’ deeper understanding of





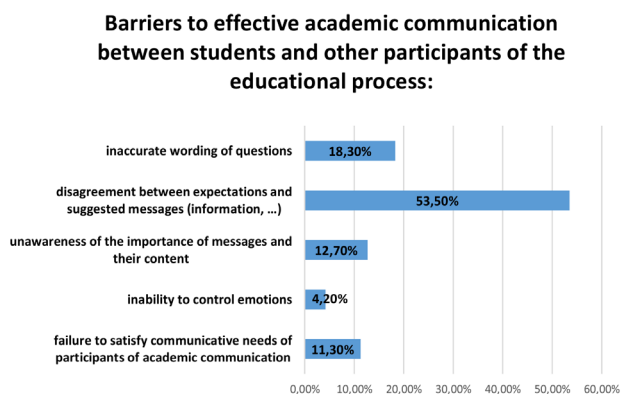
**Figure 2.** Understanding of the university from a communicative point of view as we can see, majority of the respondents consider contradiction between

the tasks and the mission of a modern university being not only an institution where education is obtained and competencies are formed, but also a space in which values of educated people and elites are gelled (see figure 2).

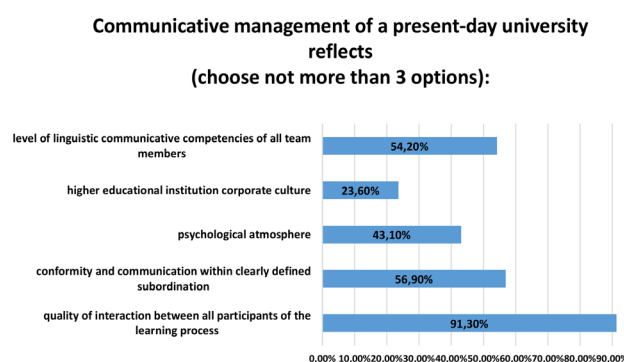
As we can see, majority of the respondents consider contradiction between expectations and real messages to be the main barrier in establishing effective academic communication. We think this contradiction can be overcome by monitoring not the very course of the learning process, but the attitudes, plans and goals set by students while being in the status of applicants. Fairly frequent answers about not realizing the importance of messages, their content, as well as not meeting communication needs as serious obstacles to establishing productive interaction in a modern university proved to be rather expected. We found such considerations of students earlier, while teaching the courses “Public Communication”, “Management in Education”, “Rhetoric”, “The Ukrainian language (for professional purposes)”. Thus, we should not underestimate the importance of the linguistic aspect in academic communication - mastery of an arsenal of communicative strategies and tactics, communicative qualities of a language (accuracy, conciseness, emotionality and expressiveness etc.), rhetorical knowledge and skills and so on (see figure 3).

The respondents’ treatment of the essence of communicative management showed a certain polarity. On the one hand, there still exists the stereotype of authoritarian government in academia, where subordination and hierarchy are reflected in communication as well as in the learning process. On the other hand, a democratic, progressive vision of management processes in a modern university is reduced to the rational interaction of all participants endowed with an appropriate level of linguistic and communicative competencies (see figure 4).

The students consider interpersonal (person-to-person) communication the most productive form of communication in the educational environment, which indicates the participants willingness to interact with each other. Group and intergroup forms communication are, on the contrary, the least productive (see figure 5).

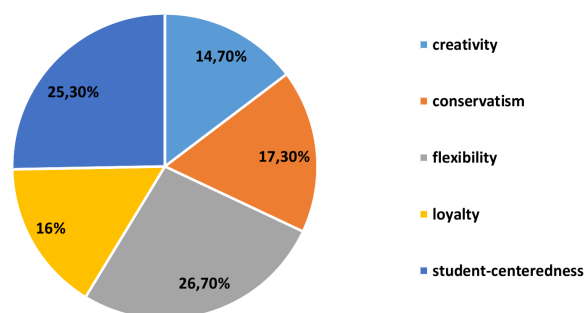


**Figure 3.** Understanding of the university from a communicative point of view as we can see, majority of the respondents consider contradiction between



**Figure 4.** Correlation between the concepts of “communicative management” and “interaction in the academia”

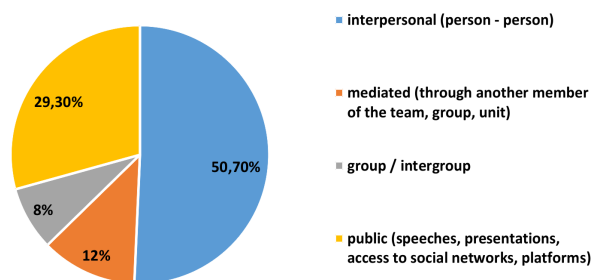
**What features, in your opinion, most accurately characterize academic communication?**



**Figure 5.** Forms of communication in educational environment

The features most accurately characterizing academic communication, in the opinion of the respondents, are flexibility and student-centeredness, which provide comfortable conditions to interact, develop students’ individual trajectories, achieve both personal and professional goals. Public forms of communication, such as public speeches, presentations, social networking, etc. have become of huge importance. This vision reflects close con-

**What forms of communication do you consider the most productive in educational environment?**



**Figure 6.** Characteristic features of academic communication

nection between the academic environment and the social (internal and external) one (see figure 6).

The results of the research showed the students' need for a deeper study of the communicative management resources to achieve effective academic interaction, to gain professional experience, communication management practices, which can later be implemented in professional activities.

#### 4 Conclusions

In the current conditions for the university to increase its competitiveness in the labor market, special attention should be paid to intensifying the process of communication management. It allows to identify the most effective mechanisms of interaction of all participants in the learning process in the internal setting of the university, helps to overcome communication barriers, to develop a corporate academic culture.

According to the results of the research, students strive for constructive communication due to their active communicative position and awareness of responsibility. The purpose of this communication lies in joint activities of all participants of the learning process to solve current issues of every university and higher education in general. They are interested in situations in which collective management decisions are made. As we can see, the effective interaction contributes to the high quality of educational services, educational environment, management of the learning process and the university under present-day conditions.

As managers of present-day universities shape the purpose of educational activities and ensure its achievement,

their conceptual, communicative and managerial competencies affect the achievement of the goals of higher educational institutions. In fact, communicative management allows to establish connections and communication, form the organizational structure, a system of information exchange in academia and meet the needs of the management process in general and each participant in particular. The university's relations with external entities are the key to success in positioning itself in a broad educational discourse. This contributes to the optimization of management processes, the development of the university through the powers of communicative management.

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# Structural and functional model of developing pedagogical skills of teachers of economics in Master's degree programmes

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**Abstract.** The article represents a structural and functional development model of pedagogical skills of teachers of economic disciplines in Master's degree programmes with carrying out and proving its theoretical substantiation and the expediency of its use. The interconnected, namely theoretical, semantic and effective blocks of the suggested model are analyzed. The components, criteria and levels of pedagogical skills are described as well. The article identifies such approaches to the development of pedagogical skills of teachers of economic disciplines in Master's degree programmes, as psycho-didactic, competence, activity and innovative; the principles that must be followed in the development process of pedagogical skills of teachers of economic disciplines in Master's degree programmes, namely, professional orientation, subjectivity, priority of active teaching methods, interactive technologies and self-improvement are also characterized. The effectiveness of the structural and functional model introduction of pedagogical skills development of teachers of economic disciplines in the Master's degree programmes was tested experimentally.

## 1 Introduction

Ukraine's integration into the world educational environment requires constant improvement of the national education system, searching for the effective ways to improve the quality of educational services, development of pedagogical skills of teachers, testing and implementation of innovative pedagogical systems, real opportunities and freedom of choice in education process, education updating and organization in accordance with the world trends, ensuring the continuity of education. The transition of higher education establishments of Ukraine to a new educational paradigm along with the entry into the European educational space strengthens the requirements for professional pedagogical competence of teachers of higher education institutions. A modern teacher must have the necessary qualities and professional knowledge, be familiar with modern advances in science, and be able to navigate freely within information flows, be ready for the constant development of their pedagogical skills.

There is no sufficient professional training of future specialists to teach in higher education establishments, so the role of programmes for the development of pedagogical skills in terms of the Master's degree programmes in most non-pedagogical universities is growing.

Under today's conditions there is a need for special training of future teachers so that they can work with

students more effectively, be successful in teaching, research and achieving personal growth as professionals.

The analysis of the experience of higher education establishments of economic profile shows: in educational activities, most of such institutions focus on the assimilation of educational material and pay less attention to preparing students for teaching economic disciplines. However, as teachers have begun to perceive and express more clearly the need to develop pedagogical skills and move in this direction, higher education establishments of economic profile recognize the need to promote the professional development of future teachers of economic disciplines.

The essence of pedagogical skills of teachers of economic disciplines lies in obtaining professional knowledge of economics, skills and abilities of teaching economic disciplines, pedagogical methods and technologies, as well as in the developed personal abilities and psychological properties that contribute to stable performance of high level pedagogical activities, timely response to changes that occur in the educational environment and adaptation to them, the presence of their own pedagogical style, the desire for personal and professional self-development. Thus, the development of pedagogical skills is recognized as a necessary part of significant professional growth.

The formation and development of pedagogical skills of teachers at higher education establishments is one of the most frequently discussed and important topics in academia. Significant influence on the development of theoretical foundations of pedagogical education and

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the development of pedagogical skills in the European and world educational space has been exerted by the research carried by H. Altrichter, A. Feldman, P. Posch, B. Somekh [1], A. Beach, M. Sorcinelli, A. Austin, J. Rivard [2], G. Kelchtermans [3], M. Kennedy [4], J. Bowen [5], J. Eyler [6], C. Haras, S. Taylor [7], K. Winter, J. Kent, R. Bradshaw [8], E. Watson [9]. The common opinion in these scientists' works is that results of scientific research should be put into practice in order to increase the level of professional and pedagogical training and the development of pedagogical skills.

We analyzed the foreign experience in the development of pedagogical skills of teachers in the United States, Canada and Western Europe. The analysis of experience revealed a set of tendencies in the development of pedagogical skills of teachers. The most prominent among them are

- the growth in the number of multidisciplinary establishments of higher education that provide training for teachers
- increasing the term of study in pedagogical educational establishments to five years,
- focusing attention on professional orientation to pedagogical specialties in the family, establishments of secondary and higher education, improving the structure, organization, forms and methods of pedagogical orientation,
- increasing the requirements for entrants to pedagogical educational establishments, developing effective forms of diagnosis and testing of personal psychophysiological characteristics, goals and motives in the process of future students selection for pedagogical specialties,
- improving the quality of pedagogical skills development programs for teachers of various specialties, taking into account modern scientific achievements related to professional along with psychological and pedagogical training of teachers,
- increase in the number of psychological and pedagogical disciplines, despite a slight decrease in the number of hours to study them in higher education, application of the principles of electiveness and integrativeness, increasing requirements for content and quality of teaching, use of intensive, developmental teaching methods,
- giving more attention to the development of future teachers' independence and activity in acquiring practical skills,
- increasing attention to the development of pedagogical skills in the system of postgraduate education.

However, despite the interest of scientists concerning the development of pedagogical skills in terms of the transition of Ukrainian higher education system to the European educational space, the problem of developing pedagogical skills of teachers of economic disciplines in modern higher education establishments is not fully covered. Therefore, *the purpose of the article* is a

theoretical substantiation and experimental verification of the effectiveness of the structural and functional model of economic disciplines teachers' pedagogical skills development in Master's degree programmes.

*Research methods* to achieve this purpose:

- the method of modeling, which is essentially integrative, as it allows us to combine in pedagogical research development of pedagogical skills of teachers of economic disciplines empirical and theoretical aspects, i.e., experiment with the construction of logical structures, was applied.
- general scientific methods (analysis, synthesis, comparison, systematization, generalization) for the study of philosophical, pedagogical, psychological literature and legal basis;
- empirical methods : conversation, testing, survey and observation in order to identify the level of pedagogical skills of future teachers of economic disciplines; method of pedagogical experiment to test the effectiveness of the structural and functional model of development of pedagogical skills of teachers of economic disciplines in the conditions of Master's degree programmes;
- statistical methods: Fisher's multifunctional criterion for the purpose of levels' comparison of future teachers' of economic disciplines pedagogical skills.

## 2 Results

In order to organize the study and to improve the development process of future teachers of economic disciplines in Master's degree programmes, we have chosen the method of modeling, as one of the most effective, which is essentially integrative, as it allows us to combine empirical and theoretical aspects, i.e., an experiment with the construction of logical structures, and obtain holistic information about the object that is being under study within the pedagogical research of the development of pedagogical skills of economic disciplines teachers.

Modeling is one of the main categories of the cognition theory, as any method of scientific research is based on it – both theoretical (which uses various symbolic and abstract models) and experimental (that uses subject models) [10]. Exploring the issue of modeling the competence of participants in the educational process, A. Dakhin defines the model as an artificially created object in the form of a scheme, physical structures, symbolic forms, formulas, i.e., the one, while being similar to the studied object (or phenomenon), is reflected and reproduced in a simpler form the structure, properties, links and relations between the elements of this object [11]. We can find a similar definition of a model as a sample, an instance of something; reduced reproduction of a mechanism; type, brand, design sample; schemes to explain a phenomenon or process, in the dictionary of vocational education [12].

Structural and functional models are receiving increasing attention in terms of the modern science. The structural model simulates the internal organization of the



original. Due to the fact that structure is a way of internal organization of the object's elements, it is one of the most important aspects of anything. It is impossible to know the inner nature or the essence of objects without revealing the structure. The notion "functional model" means a model that imitates the behavior (function) of the original [13].

In the field process of research, some types can be found quite seldom in their pure form. More often mixed models are used. The proposed structural and functional model of development of pedagogical skill of teachers of economic disciplines in Master's degree programmes belongs to such type. Our choice of structural and functional model is due to the fact that the process of developing the pedagogical skills of teachers of economic disciplines is a part of a dynamic system that operates in such interrelated aspects as social and personal. Each of the components can be considered as part of another system of higher or lower level [14]. Since the pedagogical skills of teachers of economic disciplines characterize a person's professional activity, their development has a direct impact on practical, theoretical, collective and individual activities.

We should characterize the structural and functional model of development of pedagogical skill of teachers of economic disciplines in Master's degree programmes developed by us (figure 1).

The model ensures the unity of purpose, components of pedagogical skills, principles, content, forms, and methods of pedagogical skills development of teachers of economic disciplines in Master's degree programmes together with criteria and levels of their formation.

The purpose of the developed model is to ensure the positive dynamics of the development of pedagogical skills of future teachers of economic disciplines. Accordingly, the tasks are:

- to form motivation for professional and pedagogical activities and value orientations,
- to develop psychological and pedagogical competence,
- to develop organizational abilities and skills of personal interaction,
- to develop ability to do analytical activity.

We have chosen three main blocks: theoretical, content-procedural and effective. We are going to describe each of them.

The first block, theoretical, is aimed at substantiating scientific approaches and principles of development of pedagogical skills of teachers of economic disciplines in Master's degree programmes. Important dominant factors that influenced the design of our model are the theoretical foundations of pedagogical skills. The theoretical block of our model involves taking into account the initial theoretical and methodological provisions, which include psycho-didactic, competence, activity and innovation approaches.

The process of development of pedagogical skills of teachers of economic disciplines in the Master's degree programmes is, of course, a complex psychodidactic system, so the study of theoretical, pedagogical and

psychological principles of the educational process, obviously, requires a psychodidactic approach.

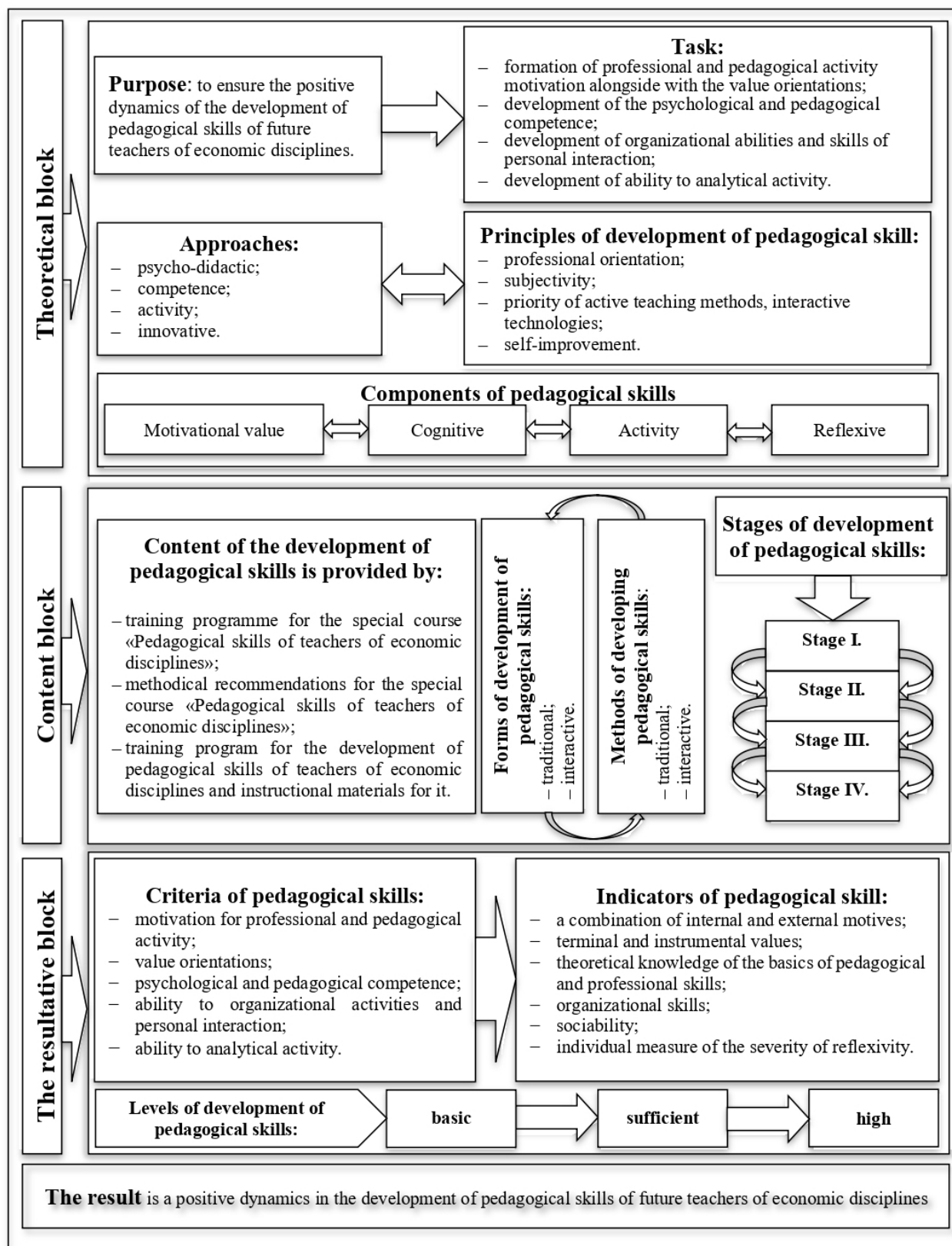
Taking into account the competency approach in the development of pedagogical skills of teachers of economic disciplines in the Master's degree programmes ensures the development and improvement of such important qualities for future pedagogical activity as moral, value, independence, desire for self-development and self-improvement, readiness for reflection.

The activity approach is aimed at forming the activity of future teachers of economic disciplines, which contributes to the growth of independence, creativity, confidence in their abilities as well as the development of their pedagogical skills. We agree with N. Overko that the implementation of the activity approach to the development of pedagogical skills contributes to the formation of personality orientation, subjective experience, improvement of pedagogical techniques and self-regulation [15].

The current trends in education make new demands on the involvement of Master's degree programmes students in the educational process design. This determines the need for its organization, taking into account individual needs and capabilities. The task is to identify the future teacher's need for conscious learning. However, not every future teacher has a practical understanding of what he or she needs for the further growth, professional self-realization and development of pedagogical skills. Since the readiness to develop as a natural need cannot be provided from the outside, it should be formed by introducing an innovative approach, involving graduate students in more effective role models, career planning, conducting experiments that allow assessing the difference between the current state and the desired or the required level.

The principles determine the strategy and tactics of practical activity of teachers, the nature of their creative interaction in the educational process. In our model, we defined the need to comply with the following principles in the process of development of pedagogical skills of teachers of economic disciplines in the Master's degree programmes: professional orientation, subjectivity, priority of active teaching methods and interactive technologies, self-improvement.

The principle of professional orientation is based on the need for fundamental training of teachers of economic disciplines, which provides them with professional knowledge, because the teacher who does not have proper basic training cannot navigate in conditions that are objectively constantly changing. Under such conditions the competence is lost as well. One of the ways to express this principle is to combine the general scientific and methodological components of the structure of disciplines of the economic cycle. The complex of economic disciplines should provide the future teacher, on the one hand, with a modern scientific interpretation of all basic concepts and facts of the discipline, a fairly broad worldview, and, on the other hand, with knowledge of teaching methods of these disciplines. Thus, when choosing teaching methods, we give preference to those



**Figure 1.** Structural and functional model of development of pedagogical skill of teachers of economic disciplines in the conditions of a Master's degree programmes

methods that will be used by the future teacher. The principle of professional orientation also presupposes that all disciplines of fundamental training contribute to the acquisition by students of skills of pedagogical activity, as educational activity is leading in higher education establishments.

The principle of subjectivity recognizes the individual's right to uniqueness, inner freedom, activity and spirituality, based on the interests of the educational process and priority of personality based technologies that ensure a focus on the development of pedagogical skills of teachers of economic disciplines in Master's degree programmes which shifts the emphasis from knowledge, skills and abilities to personal progress, provides the fundamentals for the development process of pedagogical skills, which consists of elaborating its own concept of teaching economic disciplines, mastering psychological, pedagogical and management technologies, including creativity in teaching.

One of the most important areas of pedagogical skills development of teachers of economic disciplines and a prerequisite for the effective implementation of the competency approach is the introduction of active methods in the educational process of higher economic education. The principle of priority of active teaching methods and interactive technologies implies the need for the use of new educational technologies and forms of educational activities. First of all, it is the need to move from informational methods and forms of learning to active, to change orientation from knowledge to activity approach, to find opportunities to combine students' theoretical knowledge with their practical needs [16].

Implementation of self-improvement principle is possible under the conditions of mastering by future teachers of economic disciplines the ability to independently develop strategy and tactics of tasks related to educational activities, find the necessary professional information and operate it simultaneously with solving theoretical and practical problems, obtain new knowledge, necessary to achieve educational goals, search for new means of solving educational problems, formulate tasks for self-development and identify ways to implement them.

Based on a hierarchical system of principles defined by us, the model of development of pedagogical skills of teachers of economic disciplines in the Master's degree programmes is implemented through the functioning of such components of pedagogical skills as motivational value, cognitive, activity and reflexive.

Motivational value component of pedagogical skills is a structured system of personal formations, which is manifested in the value and semantic attitude to professional and pedagogical activities and desire as well as willingness to develop pedagogical skills. The cognitive component of pedagogical skills of teachers of economic disciplines is associated with a meaningful, conscious attitude to professional and pedagogical activities along with the development of pedagogical skills and involves the acquisition of the following knowledge: general theoretical, psychological and pedagogical, professional

economic, that of the basics of information technology in education. The activity component of pedagogical skills takes into account the formation of organizational and communication skills among the future teachers of economic disciplines, their level of mastery of gnostic, design, methodological skills and abilities to apply them in practice. The reflexive component of pedagogical skills characterizes the teacher's knowledge and ability to analyze the phenomena of his or her own consciousness and activity. It is realized through such reflexive processes as self-understanding and understanding of others, self-evaluation and evaluation of others, self-interpretation and interpretation of others.

The semantic block of the model directly reflects the content of the development of pedagogical skills of teachers of economic disciplines in Master's degree programmes. The content of the development of pedagogical skills is provided by: the curriculum of the special course "Pedagogical skills of teachers of economic disciplines"; methodological recommendations "Development of pedagogical skills of teachers of economic disciplines"; program and instructional materials for the "Training of pedagogical skills of teachers of economic disciplines". This includes, in particular, deepening of theoretical pedagogical knowledge, improvement of practical skills and abilities of teachers, mastering of modern achievements of the advanced pedagogical experience, development of creative abilities, formation of need for constant self-improvement.

According to the content of pedagogical skills development of teachers of economic disciplines in Master's degree programmes we offer the use of various forms: traditional (lectures, practical classes, independent work, tests) and interactive (training, discussion with use of multimedia technologies, work in small groups, business game and public events).

For the development of pedagogical skills of teachers of economic disciplines in the Master's degree programmes we have proposed traditional methods (verbal, visual, practical, methods of logic content perception) and interactive methods (brainstorming, portfolio, analysis of specific situations, problem solving, game technology, game design, presentations and simulation exercises) that provide the formation and improvement of one's own teaching style and methods of economic disciplines teaching.

The dynamics of pedagogical skills development of teachers of economic disciplines in the conditions of Master's degree programmes allows reflecting the effective block of the model, developed by us, which provides the characteristics of criteria for estimating the levels of formation of teachers' pedagogical skills concerning the economic disciplines (motivation for professional and pedagogical activity; value orientations; psychological and pedagogical competence; personal interaction; ability to do analytical activities) and their indicators (combination of internal and external motives; terminal and instrumental values; theoretical knowledge of the basics of pedagogical skills and professional skills;

organizational skills; sociability; individual measure of reflexivity).

Now we are going to characterize each of the indicators.

1. An indicator of motivation for professional and pedagogical activity is a combination of internal and external motives. Motivation for the professional and pedagogical activity is characterized by the desire for self-realization and satisfaction of professional needs; professional guidelines, values, aspirations of a high level of professional results that will lead to recognition among colleagues and students as a professional teacher; awareness of methods of encouragement, stimulation and motivation of students for studying, development of their professional orientation; willingness to take responsibility for the results of their activities.
2. The system of value orientations is characterized by the terminal and instrumental values formed in future teachers of economic disciplines. We take into account only those values that, in our opinion, are important for the effective development of pedagogical skills. These are such terminal values as the maturity of judgments; interesting professional activity; cognition (opportunity to widen one's education, general culture, intellectual development); development (work on oneself, constant physical and spiritual improvement); freedom (self-sufficiency, independence); creativity (possibility of creative activity); self-confidence (inner harmony), as well as such instrumental values as politeness (good manners); diligence (discipline); independence (ability to act independently); education (breadth of knowledge, high level of general culture); rationalism (the ability to think logically, make deliberated and rational decisions); self-control (restraint, self-discipline); courage in defending one's opinion; tolerance for the views and opinions of others; breadth of views (the ability to understand a different point of view, respect other tastes, customs and habits).
3. Indicators of psychological and pedagogical competence are theoretical knowledge of the basics of pedagogical and professional skills that future teachers acquire, namely, understanding of the peculiarities of curricula framing and the ability to apply knowledge about relevant factors and processes for decision-making concerning the academic plan; understanding of the relationship between the assessment and teaching along with the ability to use formal and informal assessment in order to understand the students better; planning of the educational process; control of the understanding of the content of educational material along with making changes in teaching activity; awareness of different evaluation strategies, ability to analyze evaluation results; understanding of different approaches to pedagogical activity and ways of applying them for assistance of educational activity of students; awareness of educational material which includes the teaching methods peculiarities that contribute to a better understanding of its content; ability to apply appropriate teaching methods in order to develop competence in the field of science that is being studied as well as to analyze gaps in students' understanding of the material content in order to improve teaching; understanding of the principles and procedures of the classes organization and the ability to apply such knowledge for the development of educational activities of students and help them to achieve better results considering their educational goals; understanding of external and internal motivation, the relationship between motivation and students' achievements, strategies, principles and practical methods of motivation and ways to effectively apply such principles and methods to promote active students' participation in learning; acquisition of the new information, development of their self-motivation and independence; understanding of the basics of communication theory; awareness of the ways to improve professional knowledge, skills and abilities and the development of pedagogical skills.
4. Organizational skills and sociability are indicators of the ability to do organizational activities and personal interaction of the future teachers. Organizational skills are manifested in the rapidity of orientation in difficult situations, initiative, ability to anticipate the consequences of their actions, endurance, demanding, propensity to organizational activities, independence, self-criticism, attitude to social activity, ability to project student personality in the process of education, ability to unite students and direct them towards performing socially significant tasks, the ability to distribute attention between several activities simultaneously. Sociability is manifested within the ability of an individual to establish, sustain and maintain good personal and business relationships with others, tact, ability to express their thoughts and expressions through verbal and nonverbal means, the ability to formulate a problem, present material in an accessible form, arouse cognitive interest in learning disciplines, in understanding the psychology of the student, mastering the techniques of emotional and volitional influence on students.
5. An indicator of the ability to do analytical activity is an individual measure of the reflexivity manifestation. Reflexivity is manifested in the ability to realize one's motives, goals, mental and emotional state in a situation of choosing a style of behavior and on this basis to build a strategy for their activities. Professionally oriented critical thinking includes professional intelligence, culture of professional thinking, ability to identify laws, principles and rules of professional and pedagogical



activity, analysis, forecasting, designing, planning of self-development in the context of general and professional culture; developed professional memory, which provides not only the preservation of meaningful information, but also its active mental processing, establishing logical and associative connections, verbal thinking, ability to make verbal analogies, erudition and the ability to hold constructive professional dialogue. The ability to do analytical activities is characterized by breadth and flexibility of thinking, objectivity, comprehensive consideration of problems, and awareness of ways to apply the accumulated theoretical basis in practice.

The pedagogical skills of future teachers of economics are characterized by three levels (basic, sufficient and high), which will allow us to compare the predicted and obtained results of diagnosis and adjustment of this process.

Results of the experimental study confirmed the effectiveness of our substantiated structural and functional model of pedagogical skills development of economic disciplines teachers in Master's degree programmes. To conduct the experiment, we created a program and research plan; the required number of participants in the experimental study was determined; the criteria were selected and substantiated. The experimental study involved three stages: ascertaining, formative and generalizing.

The ascertaining experiment was conducted on the basis of Kyiv National Economic University named after Vadym Hetman, State University of Economics and Technology, Kherson National Technical University. At different stages of the study, 250 students at the second (the Master's) level of higher education in economic specialties took part in the experiment.

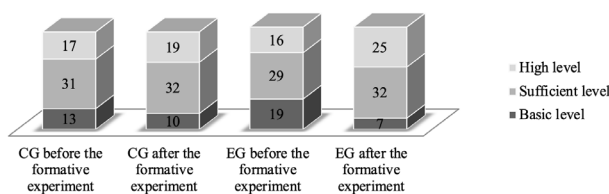
Determining the level of development of pedagogical skills of respondents of control and experimental groups to the formative experiment was carried out using a set of methods: the method of determining the motivation of professional activity (K. Zamfir modified by A. Rean; "Value orientations" by M. Rokych; the author's test to identify the level of psychological and pedagogical competence of future teachers of economics, rapid diagnosis of organizational skills M. Fetiskin, V. Kozlov, H. Manuilov; methods of assessing the level of sociability by V. Riakhovsky and methods of diagnosis of individual reflexivity manifestation by A. Karpov (table 1)).

We performed a qualitative and quantitative analysis of the input diagnosis results and determined the levels of pedagogical skills of future teachers of economic disciplines. The analysis of the results of the observational experiment showed the predominance of basic (25.6% of people) and sufficient (48% of people) levels of development of pedagogical skills. This gave grounds to conclude that at the present stage of development of higher economic education there is a need to create more effective mechanisms for training and development of pedagogical skills of future teachers of economic

disciplines in the Master's degree programmes by means of improving the content, forms and methods for organizing this process, implementation of programs for the development of pedagogical skills in terms of Master's degree programmes aimed at preparing future teachers of economic disciplines for the introduction of modern leading pedagogical technologies and the formation along with development of their own pedagogical style.

Improving the level of pedagogical skills was carried out at the formative stage of the experiment through the introduction of the proposed content, forms and methods of their development in the Master's degree programmes. The curriculum of the special course "Pedagogical skills of teachers of economic disciplines" in the educational process of higher education establishments for students at the second (the Master's) level of higher education in economic specialties was introduced; methodological recommendations for the special course "Pedagogical skills of teachers of economic disciplines" and pedagogical skills development training program for teachers of economic disciplines and instructive-methodological materials to it were implemented as well. Implementation was carried out by using traditional and interactive forms and methods of pedagogical skills development.

At the generalizing stage of the research, the results of the diagnosis in the experimental group revealed positive changes in the levels of development of pedagogical skills of future teachers of economic disciplines (figure 2).



**Figure 2.** Dynamics of the future teachers of economic disciplines pedagogical skills development before and after the formative experiment

The number of respondents in the experimental group with a basic level of pedagogical skills has more than halved: from 19 people (29.69%) to 7 people (10.94%). The changes have also occurred in the number of future teachers who have a sufficient level of pedagogical skills. The number of such people increased from 29 people (45.31%) to 32 people (50%). More significant changes were found in the number of people with a high level of pedagogical skills. Participants in the experiment with a high level of pedagogical skills before the formative experiment of the study were 16 people (25%) and after the formative experiment were 25 people (39.06%).

In order to compare the results of the identified levels of future economics teachers' pedagogical skills, we used the multifunctional Fisher's test. Thus, the indicator ( $\varphi_{empirical}$ ) of sufficient and high levels of pedagogical skills of the experimental group before and after the formative experiment is equal to 2.72, which

**Table 1.** Levels of pedagogical skills before the formative experiment

№	Levels Indicators	Basic		Sufficient		High	
		CG (61 people)	EG (64 people)	CG (61 people)	EG (64 people)	CG (61 people)	EG (64 people)
		Quantity (%)	Quantity (%)	Quantity (%)	Quantity (%)	Quantity (%)	Quantity (%)
1.	A combination of internal and external motives	5 (8,2)	13 (20,3)	15 (24,6)	13 (20,3)	41 (67,2)	38 (59,4)
2.	Terminal and instrumental values	19 (31,2)	28 (43,8)	36 (59,0)	33 (51,6)	6 (9,8)	3 (4,6)
3.	Theoretical knowledge of the basics of pedagogical and professional skills	28 (45,9)	29 (45,3)	28 (45,9)	30 (46,9)	5 (8,2)	5 (7,8)
4.	Organizational skills	8 (13,1)	9 (14,0)	37 (60,7)	38 (59,4)	16 (26,2)	17 (26,6)
5.	Sociability	4 (6,6)	8 (12,5)	27 (44,3)	24 (37,5)	30 (49,2)	32 (50,0)
6.	Individual measure of the severity of reflexivity	12 (19,7)	28 (43,8)	44 (72,1)	33 (51,6)	5 (8,2)	3 (4,6)
<b>The arithmetic mean of pedagogical skills</b>		<b>13 (21,3)</b>	<b>19 (29,7)</b>	<b>31 (50,8)</b>	<b>29 (45,3)</b>	<b>17 (27,9)</b>	<b>16 (25,0)</b>

is more than the critical value ( $\varphi_{critical} = 2.31$ ) of the level of statistical significance accepted in psychology. Comparison of the percentage of study participants with high and sufficient levels of development of pedagogical skills in the experimental group before and after the formative stage of the pedagogical experiment made it possible to prove the reliability of the results.

### 3 Conclusion

The modern system of professional training of economic specialists for teaching activities consists of the insufficiently developed mechanisms for the development of pedagogical skills. This necessitated the further development of the studied quality improvement model.

The structural and functional model of pedagogical skills development of teachers of economic disciplines in Master's degree programmes that was substantiated and developed by us, includes the definitions of the purpose, tasks, the theoretical block, the semantic block and also the feedback mechanism reflected in the effective block. The structure of the model is based on the logic of the studied process: from the existing initial state of formation of the basics of pedagogical skills to purposeful gradual achievement by future teachers of a higher level of pedagogical skills, so it allows testing the effectiveness of Master's degree programmes conditions experimentally. The expected increase in the level of economics teachers' pedagogical skills will motivate them further succeed, expand their professional worldview, develop creativity and critical consideration of organization of the educational process in higher economic education establishments. The introduction of the proposed structural and functional model of pedagogical skills development in the Master's degree

programmes makes it possible to form the pedagogical competence of teachers of economic disciplines, which is the integration of theoretical knowledge, practical skills and important personal qualities of the teacher.

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## Organizational and pedagogical conditions for training higher education applicants by learning tools of a competence-oriented environment

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**Abstract.** The organizational and pedagogical conditions for training higher education applicants by learning tools of a competence-oriented environment are analysed. Such pedagogical conditions include integration of the educational process in the context of the face-to-face training and a competence-oriented computer environment, providing systematic interactive work and performance of rating tasks in a learning environment focused on competence and systematic monitoring and control over the process of training of higher education applicants. In order to study the feasibility of using organizational and pedagogical conditions for the training of higher education applicants by learning tools of a competence-oriented environment, the degree of competence of the expert commission was checked and the indicators of competences of experts were calculated. Experimental work on determining the coefficient of concordance gives the opportunity to state that the opinions of experts on the organizational and pedagogical conditions for the training of higher education applicants by learning tools of a competence-oriented computer environment are consistent. It is noted that the implementation of organizational and pedagogical conditions, in fact, involves the optimization of educational and cognitive activities of higher education applicants, and taking into account certain conditions will lead to renewal, productivity, continuity and integrity of acquisition of the competences.

### 1 Introduction

Dynamic increase in the amount of knowledge to be acquired by the higher education applicant during the years of study at the higher education institution, increasing the requirements for his professional and special training necessitates, the urgent need for a comprehensive and deep study of the system, pedagogical methods, external and internal factors of formation of specialist regularities and features of vocational training and their use in the educational process. The understanding of events, facts, phenomena is changing rapidly, it requires to constantly monitor the information, which makes it impossible to immerse oneself in a specific problem during only the study time. To solve the problem of improving the quality of perception of educational material in higher education, organizational and pedagogical conditions are introduced, which include integration, regularity and monitoring of educational activities and as a result – the acquisition of competencies. Such conditions can contribute to the formation of important components of professional competence, as well as the achievement of two strategic goals – improving the efficiency of all types of educational activities and improving the quality of training higher education applicants in accordance with modern information society.

The relevance of the study of the problem is determined by a set of factors. First, the integration of the

learning process in the context of the face-to-face training of the higher education institution and the competence-oriented computer environment. At the stage of transformation processes in modern society, the processes of integration into the education system acquire national significance, it becomes a necessary condition for the growth of professionalism of the specialist. Secondly, the problem of providing systematic interactive work and performance of rating tasks in a competence-oriented computer environment is caused by the need to resolve socio-pedagogical contradictions between the needs of pedagogical science and the need to predict trends in the national education system, social demands of society for training specialists and real practice. Third, the objective need for systematic monitoring and control over the process of training is determined by the needs of development and analysis of trends in higher education. Optimally selected pedagogical conditions for the training higher education applicants contribute to the formation of the ability of the future specialist to work in modern conditions.

### 2 Literature review

The use of electronic resources in the educational process in higher education can contribute both to developing professional skills and gaining the experience of using online environment [1, 2]. The features of influence on the configuration of computer-based environment of hardware and software ICT tools, decomposition of techniques of

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their use in educational process of educational institutions are considered [3].

The tendencies to the learning outcomes description are revealed on the basis of the European Digital Competence Framework 2.0 and Digital Competence Framework 2.1 [4, 5]. Competency-based learning refers to systems of instruction, assessment, grading, and academic reporting that are based on students demonstrating that they have learned the knowledge and skills they are expected to learn as they progress through their education, its general goal is to ensure that students are acquiring the knowledge and skills that are deemed to be essential to success in school, higher education, careers, and adult life [6, 7].

The European Commission adopted Competences for Lifelong Learning [8]. Critical thinking, entrepreneurship, problem solving or digital competences are just some of the competences [9–12]. It is provided a valid and reliable instrument to measure teachers' digital competence on the basis of the European Framework for the Digital Competence of Educators (also referred to as DigCompEdu) and to examine the relation between in-service teachers' digital competence and personal and contextual factors [13, 14].

Learner-centered environments tended to show greater numbers of positive outcomes than did knowledge-centered environments [15]. Conditions of e-learning associated with institutional, developer, instructor, student and technology issues were identified [16]. The design of blended learning environments brings with it some challenges: incorporating flexibility, stimulating interaction, facilitating students' learning processes [17–21].

The issue of pedagogical conditions was investigated by researchers G. T. Karabalaeva, U. Z. Akmatova [22], E. V. Muravyova, S. G. Dobrotvorskaya and E. I. Alekseeva [23], A. Salavatova, E. Bauer and O. Istrofilova [24], O. Kovshar, M. Baditsa and K. Suiatynova [25].

The importance of development the pedagogical conditions for forming the information competence is noted [26]. The study examined the extent to which instructional conditions influence the prediction of academic success in the undergraduate courses offered in a blended learning model. The results suggest that it is imperative for learning analytics research to account for the diverse ways technology is adopted and applied in course-specific contexts [27].

A consistent transition between disciplines will contribute to the formation of a consistency of knowledge based on the development of general scientific ideas and concepts, the improvement of professionally oriented knowledge and skills of students [28]. Using ICT tools it is possible to overcome the challenges and to realize the acquisitions of the competences [7, 29–39].

The designing e-assessment processes aligned with competences and learning activities is useful for helping students attain the desired competence levels [40, 41]. There are revealed a set of cloud computing tools for certain collaborative learning activities categorized under sharing, editing, communication and discussion [42, 43].

The research trends were identified: theoretical foundations of multimedia learning, representations and princi-

ples, instructional design and individual differences, motivation and metacognition, and video and hypermedia [44]. Analysing scientific and pedagogical sources and taking into account world experience, it can be argued that in order to achieve maximum results, higher education institutions need to use the organizational and pedagogical conditions that provide the development of the future specialist's professional competences.

**The aim of the article** is to theoretically substantiate and experimentally check the organizational and pedagogical conditions for the training of higher education applicants by learning tools of the competence-oriented environment.

### 3 The method of determination of the competence of experts

In order to check the expediency of using the organizational and pedagogical conditions, 15 experts were selected. To test the level of competence of the expert panel, we calculated the corresponding expert competence factor. As an important criterion for the selection of experts was their competence, during the evaluation we used the proposed method [45]. When selecting the experts, we took into account their pedagogical experience, the availability of printed works on certain problems and participation in activities aimed at improving the quality of training of higher education applicants in terms of a competence-oriented computer environment.

For the indicator that determines the length of service of an expert with higher education applicants –  $K_{ser}$  (length of service) – the following values correspond:

- experience of work of an expert with higher education applicants up to 5 years - 0.3;
- experience of work of an expert with higher education applicants from 5 to 8 years – 0.4;
- experience of work of an expert with higher education applicants from 8 to 12 years – 0.5;
- experience of work of an expert with higher education applicants from 12 to 15 years – 0.6;
- experience of work of an expert with higher education applicants from 15 to 20 years – 0.7.

The availability of printed works on problems related to the vocational training of higher education applicants and the introduction of massive online learning in higher education in Ukraine, is determined by the following values of the coefficient of publications –  $K_{p.UA}$ :

- up to 5 publications are available – 0.3;
- from 5 to 10 publications are available – 0.4;
- from 10 to 20 publications are available – 0.5;
- from 20 to 30 publications are available – 0.6;
- from 30 to 40 publications are available – 0.7.

The availability of printed works on problems related to the vocational training of higher education applicants

and the problems of the introduction of a competence-oriented computer environment abroad in English ('publication rate'), denoted by the following values of the coefficient ( $K_{p.Eng.}$ ):

- up to 5 publications are available – 0.3;
- from 5 to 10 publications are available – 0.4;
- from 10 to 20 publications are available – 0.5;
- from 20 to 30 publications are available – 0.6;
- from 30 to 40 publications are available – 0.7.

The availability of certificates certifying the completion of the course in a competence-oriented computer environment is indicated by the following coefficient values ( $K_{cer}$ ):

- up to 3 certificates are available – 0.3;
- from 3 to 5 certificates are available – 0.4;
- from 5 to 10 certificates are available – 0.5;
- from 10 to 20 certificates are available – 0.6;
- more than 30 certificates are available – 0.7.

The presence of self-developed open online courses in a competence-oriented computer environment is indicated by the following coefficient values ( $K_{cour}$ ):

- online course is available – 0.3;
- from 2 to 4 online courses are available – 0.4;
- from 4 to 6 online courses are available – 0.5;
- from 6 to 8 online courses are available – 0.6;
- more than 8 online courses are available – 0.7.

The degree of interest and competence of experts in the implementation of the competence-oriented computer environment in the vocational training of higher education applicants is determined by the following coefficient values ( $K_{exp.}$ ):

- the expert has doubts about the implementation of training for higher education applicants in a competence-oriented computer environment – 0.3;
- the expert shows interest in the introduction of a competence-oriented computer environment in the training of higher education applicants – 0.4;
- the expert is pleased to introduce a competence-oriented computer environment in the training of higher education applicants – 0.5;
- the expert has the theory and practice of introducing a competence-oriented computer environment into the training of higher education applicants – 0.6;
- the expert has the skills and competencies to implement a competence-oriented computer environment in the training of higher education applicants – 0.7.

Given the value of the indicators, we determine the competence of each expert  $K_{com}$ :

$$K_{com} = \frac{K_{ser} + K_{p.UA} + K_{p.Eng.} + K_{cer} + K_{cour} + K_{exp.}}{4.2} \quad (1)$$

The maximum possible total coefficient of competence for the ideal expert can be calculated by the formula:

$$K_{ser} + K_{p.UA} + K_{p.Eng.} + K_{cer} + K_{cour} + K_{exp.} = 0.7 + 0.7 + 0.7 + 0.7 + 0.7 + 0.7 = 4.2 \quad (2)$$

For the ideal expert  $K_{com} = 1$ .

The research methods also included analysis and synthesis of scientific, pedagogical, methodological sources and empirical methods, as well as analysis of the obtained results. Implementation of organizational and pedagogical conditions for training higher education applicants by learning tools of a competence-oriented environment is carried out on the basis of full-time and online learning. Before the introduction of organizational and pedagogical conditions and at the end of the experimental work, a study was conducted, which included an analysis of the quality of knowledge. The results obtained before and after the experiment were verified using the statistical criterion  $\chi^2$  Pearson.

#### 4 Organizational and pedagogical conditions for training higher education applicants by learning tools of a competence-oriented environment

Condition, in logic, is defined as a circumstances on which something depends; a set of rules that is established in a particular field of life; the situation in which something happens; these are the requirements to be repelled from [46]. The term 'pedagogical conditions' is defined as 'the circumstances on which the whole productive pedagogical process of professional training of professionals, mediated by the activity of the individual, by a group of people, depends' [47]. Their use in pedagogical practice contributes to the improvement of professional training include the organization and direction of the pedagogical process for the formation and development of professional readiness; application of personality-oriented approach and creation of personality-oriented relations; elimination of duplication of learning content by improving and maximizing the development of interdisciplinary links; use of virtual teaching methods with the use of information technology [48]. It is possible to define the pedagogical condition as external and internal circumstances, factors, a set of measures, factors that contribute to the successful course of a certain phenomenon; implementation of which aims to ensure a successful organizational, psychological and pedagogical, didactic support for the formation and development of the phenomenon under study.

The process of formation of pedagogical conditions is determined by the need to identify those aspects that contribute to the realization of the most important target settings of using the basic principles of vocational education as practical means for professional activity. In recent years, radical changes have occurred in the world of science. They have set new targets for the modernization of educational and e-learning environments based on a competence-oriented computer environment.

The organisational and pedagogical conditions for training higher education applicants by learning tools of a competence-oriented environment include:

- 1) integration of the educational process in the context of the face-to-face training of a higher education institution and a competence-oriented computer environment;
- 2) providing systematic interactive work and performance of rating tasks in a computer environment focused on competence;
- 3) systematic monitoring and control over the process of training of higher education applicants.

Integration of the educational process in the terms of face-to-face training of a higher education institution and a competence-oriented computer environment is one of the most promising innovations that can solve the numerous problems of the modern education system. Of course, the system of integrated learning is not well developed, that's why it is perceived by many educators ambiguously. Its full theoretical substantiation and introduction into teaching practice is a matter of the future. Integration requires the use of a variety of forms of teaching, which has an impact on the effectiveness of higher education applicants' perception of studying material. The development of the idea of knowledge integration gives the opportunity to form qualitatively new knowledge of higher education applicants, characterized by higher level of thinking, dynamic application in new situations, increasing their effectiveness and systematic work. Systemic holistic knowledge is a state, a result that can be reached through integration [49].

The competence-oriented computer environment is seen as a new organization of the educational process, based on the principle of self-study of higher education applicants. To work in a competence-oriented computer environment, it is necessary to develop methodological and technological skills of higher education applicants and professors who carry out their training. Methodical skills require knowledge of disciplines using a competence-based computer environment and dealing with structured educational information content that can be presented in the form of interactive learning tools, such as interactive lectures, multimedia simulators, presentations, creative works, individual assignments, etc. is relevant [50]. Technological skills imply ability to work with technology, it is necessary to define rational limits of requirements for personnel who will work with this technology [51]; coordination and step-by-step implementation of actions and operations aimed at achieving the desired result; the uniqueness and the regularity of the procedures and operations available in the technology.

The educational process requires constant monitoring in order to correct its development in the right direction in time. For this purpose, monitoring is used. Monitoring is a system of continuous control of the development and performance of a holistic process, which is analysed by specially selected parameters and on the basis of accepted criteria [52]. Control, as a didactic concept, is a

set of conscious actions aimed at obtaining information about the level of acquisition of higher education applicant, program material, mastering the theoretical and practical knowledge, skills and competences required in the process of performing tasks. Pedagogical control is a system of verification of the results of education and upbringing of higher education applicants [53]. Systematic monitoring and control over the process of training of higher education applicants in a competence-oriented computer environment will facilitate the intensity of their education and the acquisition of competencies in the specialty.

The implementation of the first condition was ensured through the study of disciplines in the context of face-to-face training and online learning courses in a computer environment focused on competence. Preparation for the face-to-face class involved studying the material in an online course. Thus, face-to-face training was carried out with the help of modern educational technologies and took into account the results of work in online learning courses.

The implementation of the second condition – the provision of systematic interactive work and performance of rating tasks in a computer environment, focused on competence, was carried out with the help of the specified environment. Online courses included the study of interactive lectures with video elements, complex tasks, research papers, interactive seminars and various tests.

The implementation of the third condition – systematic monitoring and control over the process of training of higher education applicants – provided for systematic monitoring of the results of tasks in the online course and the degree of acquisition of competencies. Monitoring should be carried out in relation to the completed tasks, passing tests, attending the course, reviewing modules, performing control tasks.

## 5 Results

Factor analysis in pedagogy is based on the relevant section of mathematics, where the procedure of separation of factors for a variety of reasons (variables) is developed. Its task in pedagogy is, first, to develop ways of consistent selection of causes, secondly, to reveal the mechanism of constructing factors from them and, third, to investigate objectively these factors, to determine the contribution of each to the final product, to establish a hierarchy (subordination) between them [54]. As new knowledge is accumulated by means of factor analysis (table 1), it is possible to solve more complex problems: establishing inter-factorial relationships, clarifying areas and limits of pedagogical regularities. Thus, the table gives the opportunity to get the final value in percentage. The difference with the ideal indicator is calculated as a numerical value and the factor indicator is given as a percentage. That is, the final percentage value, which is represented in the table by linear histograms, gives us an idea of each expert's level of competence. The lowest figure is 57.16 % and the highest is 83.34%. The difference between the lowest competence indicator with an expert expert's competence score is 42.84% and the difference between the highest compe-

**Table 1.** Factor analysis

Expert	Factor indicator	Difference with ideal indicator	Factor indicator, %	Resulting value, %
1	2.6	1.6	38.08	61.92
2	3.5	0.7	16.66	83.34
3	3.3	0.9	21.42	78.58
4	2.5	1.7	40.46	59.54
5	2.9	1.3	30.94	69.06
6	2.7	1.5	35.70	64.30
7	2.8	1.4	33.32	66.68
8	3.2	1.0	23.8	76.20
9	2.9	1.3	30.94	69.06
10	3.0	1.2	28.56	71.44
11	2.6	1.6	38.08	61.92
12	2.4	1.8	42.84	57.16
13	3.1	1.1	26.18	73.82
14	2.8	1.4	33.32	66.68
15	2.7	1.5	35.70	64.30

tence indicator with an expert expert's competence score is 16.66.

For the ideal expert  $K_{emp.}=1.2$ , but for real experts  $K_{emp.}$  will be less than 1. The determination of the expert competence coefficient is presented in table 2.

The representativeness of the expert group shows the arithmetic mean of the reliability of all experts and is formed by the formula:

$$K_p = \frac{K_{k1} + K_{k2} + K_{k1} + \dots K_{kn}}{15} = 0.683 \quad (3)$$

The expert group is considered representative if  $K_p \geq 0.55$ .

If 2/3 of the experts satisfy the condition  $0.55 < K_p < 1.0$ , then the results of the peer review can be considered representative. Therefore, the expert group is composed of 15 experts with a representative index of 0.683 that meets the requirements. Therefore, the results of the peer review can be considered representative. Using the method of expert assessments, we will determine the consistency of experts' opinions on the expediency of using the organizational and pedagogical conditions of applying a competence-oriented computer environment in the vocational training of higher education applicants. Expert assessments depend on the number of experts. In this case, reducing their number exaggerates the role of each of them. It is believed that the optimal size of the expert group should be 15-20 specialists. In our case, 15 experts were selected. This statistical method allows you to evaluate the phenomenon under study in the form of a generalized opinion of experts on the issue or problem. The experts expressed their opinion in terms from 1 to 10. We determined the degree of agreement of experts by the coherence of the coefficient of concordance (W). We followed the following calculation procedure.

1. Filled in the summary table of thoughts.

2. The sum of the grades obtained by each higher education applicant was calculated:  $\sum_{i=1}^{15} x_i$ .
3. The arithmetic mean of the ranks was calculated:  $X = \frac{1511}{25} = 6044$ .
4. The deviation of the sum of ranks of each indicator of the corresponding condition from the arithmetic mean sum of ranks was calculated.
5. Square the deviation of the sum of the rank of each indicator of the corresponding condition, sum the obtained numbers and find  $S = 11234$ .
6. Determine the coefficient of concordance by the formula:

$$W = \frac{12 \cdot S}{m^2 \cdot (n^2 - n)} = \frac{12 \cdot 11234.16}{15^2 \cdot (25^2 - 25)} \approx 0.038 \quad (4)$$

$m$  – the number of experts,  $n$  – the number of indicators of the relevant conditions.

Depending on the degree of importance of the experts' opinions, the coefficient of concordance is in the range from 0 (in the total absence of agreement) to 1 (with absolute unanimous vote of experts). Thus, the experimental work done on determining the coefficient of concordance gives the opportunity to state that the opinions of experts regarding the expediency of using the conditions of training of higher education applicants with the use of a competence-oriented computer environment.

Before the introduction of the conditions developed by experts in the educational process, an experimental section of knowledge was conducted. 240 people took part in the experiment, of which 119 students were a control group, and 121 – an experimental group. Upon completion of the experimental work, the level of students' knowledge was also investigated using a control slice.

We present in the form of a table the results of experimental work. Thus, the levels of knowledge quality in the control (CG) and experimental (EG) groups are presented in tables 3 and 4 in the in the form of percentage and empirical values ( $n_i$  for the experimental and  $n_{i1}$  for the control group).

It is calculated the empirical value  $\chi^2$  before and after the experiment in the control and experimental groups [54]. At the beginning of the experiment:

$$\chi^2 = \sum_{x=1}^3 \frac{(n_i - n_{i1})^2}{n_{i1}} = 0.58 \quad (5)$$

At the end of the experiment:

$$\chi^2 = \sum_{x=1}^3 \frac{(n_i - n_{i1})^2}{n_{i1}} = 54.97 \quad (6)$$

Taking into account the degree of freedom  $\nu = 2$  ( $\nu = k - 1, k = 3$ ), critical for  $\chi^2$  for statistical levels  $\rho \leq 0.05$  and  $\rho \leq 0.01$ . Thus,  $5.991 < \chi_{crit}^2 < 9.210$ . The obtained empirical value of Pearson's  $\chi^2$  before the experiment is less than critical. That is,  $\chi_{emp}^2 < \chi_{crit}^2$ , which



**Table 2.** Determination of the competence of experts  $K_{exp}$ .

Expert	$K_{ser}$	$K_{p.UA}$	$K_{p.Eng.}$	$K_{cer}$	$K_{cour}$	$K_{exp.}$	Total	$K_{com}$
1	0.4	0.5	0.3	0.5	0.4	0.5	2.6	0.619
2	0.5	0.7	0.4	0.7	0.5	0.7	3.5	0.833
3	0.7	0.5	0.4	0.5	0.7	0.5	3.3	0.786
4	0.5	0.3	0.5	0.4	0.5	0.3	2.5	0.595
5	0.5	0.4	0.7	0.4	0.5	0.4	2.9	0.690
6	0.3	0.4	0.5	0.3	0.6	0.6	2.7	0.643
7	0.5	0.4	0.5	0.4	0.5	0.5	2.8	0.667
8	0.6	0.5	0.3	0.5	0.6	0.7	3.2	0.762
9	0.5	0.4	0.5	0.7	0.3	0.5	2.9	0.690
10	0.4	0.5	0.6	0.4	0.5	0.6	3.0	0.714

**Table 3.** Levels of quality of students' knowledge in control and experimental groups at the beginning of the experiment

Level	EG, %	EG, $n_i$	CG, %	CG, $n_{i1}$
A	7.14	8	6.42	7
BC	37.50	42	41.28	45
DE	63.39	71	61.47	67
Total	108.04	121	109.17	119

**Table 4.** Levels of quality of students' knowledge in control and experimental groups at the end of the experiment

Level	EG, %	EG, $n_i$	CG, %	CG, $n_{i1}$
A	27.68	31	12.84	14
BC	63.39	71	44.95	49
DE	16.96	19	51.38	56
Total	108.04	121	109.17	119

means that they belong to the zone of insignificance, and therefore the levels of quality of students' knowledge in the control and experimental groups at the beginning of the experiment do not have significant differences.

The obtained empirical value of Pearson's  $\chi^2$  at the end of the experiment is more than the critical  $\chi_{emp}^2 > \chi_{crit}^2$ , which means that they belong to the zone of significance, and therefore the levels of quality of students' knowledge in the control and experimental groups at the end of the experiment have significant differences. The proposed organizational and pedagogical conditions for training higher education applicants by learning tools of a competence-oriented environment improve the quality of the educational process. The result of their implementation is the mastery of professional disciplines and the acquisition of quality knowledge and competences.

## 6 Conclusion

Thus, the organizational and pedagogical conditions for the training of higher education applicants by learning tools of a competence-oriented environment are theoretically substantiated and experimentally checked. Such pedagogical conditions include integration of the educational process in the context of the face-to-face training and using the competence-oriented computer environment, providing systematic interactive work and performance of rating

tasks in the competence-oriented environment focused on competence and systematic monitoring and control over the process of training of higher education applicants. The effective influence of higher education institutions on the improvement of the educational process is based on such organizational and pedagogical conditions. The implementation of organizational and pedagogical conditions, in fact, involves the optimization of educational and cognitive activities of the higher education applicants. Taking into account certain conditions will lead to a conducive learning environment and support for renewal, productivity, continuity and integrity of the acquisition of competencies.

Prospects for further research are related to the study of the specifics of monitoring activities in various areas of vocational education, as well as further improvement of the process of learning management in higher education in a combination of face-to-face and online learning.

The materials of the article can be used in the field of research of structural components of modern pedagogical processes in order to ensure their organic unity in the education system.

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# Fundamentals of UI/UX design as a component of the pre-service specialist's curriculum

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**Abstract.** Nowadays digitalization is considered to be a key driver of socio-economic development. Digital technologies are becoming the basis for creating new products and services as well as for the transition to new business models. Ukrainian course for the development of the digital economy requires the readiness of the education system to provide training of the specialists who are able to provide such transformations, which should be reflected both in the emergence of new areas of training and in focusing the content of educational training on the formation of new digital competencies of pre-service professionals. One of the competencies which is crucial and in demand today for a wide range of specialists, is the mastering the fundamentals of UX/UI-design. The purpose of the paper is to cover the approaches to the creation of the content of pre-service specialists' training on the fundamentals of UX/UI-design. The significance of the said fundamentals learning in the process of various specialists' training is discussed. It is proposed the practically-driven approach to the curriculum building. It is distinguished invariant and variable parts in the curriculum of such a training. The content of three core modules which make invariant part of the curriculum is presented. Some relevant forms of work with students are offered within each module. The prospects of the work make the preparation and doing empirical research directed on the verification of the offered approach to the curriculum building in the process of different specialists' training.

## 1 Introduction

Digitalization nowadays is considered to be a key driver of socio-economic development. Digital technologies are becoming the basis for creating new products and services as well as for the transition to new business models. Ukrainian course for the development of the digital economy requires the readiness of the education system to provide training of the specialists who are able to provide such transformations, which should be reflected both in the emergence of new areas of training and in focusing its content on the formation of new digital competencies of pre-service professionals. One of the competencies which is crucial today for a wide range of specialists is the mastering the fundamentals of user interface and user experience design (UX/UI-design).

According to special studies and evidence, UX/UI design is a high-demand field that requires the set of knowledge and skills which are applicable not only to pure IT jobs, but to a wide variety of careers, from marketing to web design to human-computer interaction. It is also pointed out that UX/UI design is a domain which is the intersection of such fields as pure design, engineering, marketing and psychology.

It is relevant to point out that there are a number of courses (specializations) available nowadays on the market of education service both in Ukraine and abroad. They provide a trainee with the set of essential practical skills, necessary to start the career interface designer from the entry-level or extend it basing on the existing skill sets.

However, contemporary higher education in Ukraine, which provides systematized learning of UX/UI design in the process of different specialists' vocational training, needs revision of existing disciplines, their educational content and its renewing on the new level understanding of the design role in the training of potential employees whose expertise expects digital products design of various purpose. The aim of the paper is to cover the approaches to the creation of the content of pre-service specialists' training on the fundamentals of UX/UI-design.

## 2 Theoretical framework

Theoretical background of the work is made by the analysis of the (1) importance of the user interface design in the process of developing of any digital mean, and (2) role of the fundamentals of UX/UI design in the vocational training of different specialists.

The user interface design of any application plays exclusive role in the digital product promoting. It shapes the user's experience, determines the product success, and ul-

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timately increases customer's satisfaction, which is really essential from the business point of view.

In the field of digital design experts distinguish user experience (UX) and user interface (UI) design which testifies that the process of interface development is complicated one and expects specific inter-discipline knowledge of a designer.

According to studies, UX design provides the development of the application features focused on improving the overall user's experience at their interacting with the digital product. UX design is aimed to achieve the application purpose and to supply the maximum user satisfaction. This kind of design creates the basis of any digital product bearing customer's demands in mind. It mainly focuses on building of the application wireframe and structuring all the components due to their functionality [1]. Hence, proper UX design must base on deep understanding of the product work, interaction between different activities initiated by the user, evolution of the scenario of the user behavior etc [2].

The UI design differs from UX design because it rather focuses on the process of application presentation and provides improving of its interactivity. This type of design concentrates on the product appearance and provides directly interaction functions [3]. There are some essential principles of UI design formulated basing on various fields of knowledge. In particular, the information must be presented aesthetically and attractively, but the applied visual means should not contradict the functional framework of the application and distract the user from its main purpose [4].

At the design developing, it is recommended [5] to follow the principle of visual hierarchy which is determined by the graphical elements ranking in accordance with their priority of using and subordination. In addition, it is pointed out the importance of visual accents and their right location; contrast using for attracting attention to the proper graphical elements; balance keeping in the elements presentation applying the concept of the visual weight and others.

On the whole, it is emphasized the importance of UI and UX design in the digital product promotion, as the both types of design shape the first user impression, and depending on their quality, the brand recognition can be created or broken.

Thus, the significance and complication of both types of design need for estimation of the role of the fundamentals of UX/UI design in the vocational training of different specialists. The analysis of the curriculum of university training of potential specialists testifies necessity of reasonable content building of UX/UI design learning [6].

In particular, it is detected that in the curriculum of IT specialists' training there are mandatory and special courses on interface design which provide students with its fundamentals. They are aimed to the software developers, demand quite narrow-specialized prerequisites, and can be inappropriate for the students of other vocations.

However, fundamentals of UX/UI design become the component of the training of really wide circle of specialists who produce different types of digital product. The

analysis of the curriculum of their training shows that the design fundamentals are included mostly as optional courses (or even some disciplines modules). Their learning does not provide potential digital designers with systematized professional knowledge and high-level skills in the field of UX/UI design. Thus, it is important to pay attention to the proper training content building.

### **3 Practically-driven approach to the building of the curriculum for UX/UI design mastering**

In this context, it would be relevant to offer and apply the practically-driven approach to the curriculum building. Due to the evidence in the field of digital product development presented above, it is recommended to distinguish invariant and variable parts in the curriculum of such a training. The invariant part might be covered by the set of academic modules which provide rather universal basis for the design mastering, whereas variable part of the specialists' preparation should includes modules of special training in terms of mastering different specific instruments of UX/UI design.

The content of modules which make invariant part of the curriculum is presented below.

The first module "Psychology of visual perception" makes a psychological base for the trainees who have to master the fundamentals of design. The content of the module is focused on the shaping of the trainees' knowledge system which is necessary for deep understanding of the psychological mechanisms and processes underlying visual perception (memory, attention, categorization, decision-making etc.). The special accents in the module are made on the semantics of graphical image due to its psychological significance [7, 8]. From the standpoint of psychology, the model of visual image creation involves some information channels. Logical channel forms the bank of reality images. Aesthetic channel composes the images. However, exactly semantic channel controls the work of logical and aesthetic channels. This channel determines the choice of images and the choice of structure of their composition which matches semantic and conveys the sense of formed visual image-text in the most efficient way.

The main forms of work within the module are master classes and workshops. During master classes main focus is given on the students' analysis of specially picked up examples of the interface which represent correct and incorrect practices from the standpoint of psychology of perception. For example, there were used the pairs of interface samples presented in the figures 1, 2 and 3 to be analyzed during the workshops.

The topic of one of the flipped learning workshops within the first module, for example, might be devoted to the psychological features of the reading process and their influence on the design of task-oriented and content-oriented interfaces (figure 3). One group of students is offered to find out and represent material on the peculiarities of these types of interface. It is expected that the students

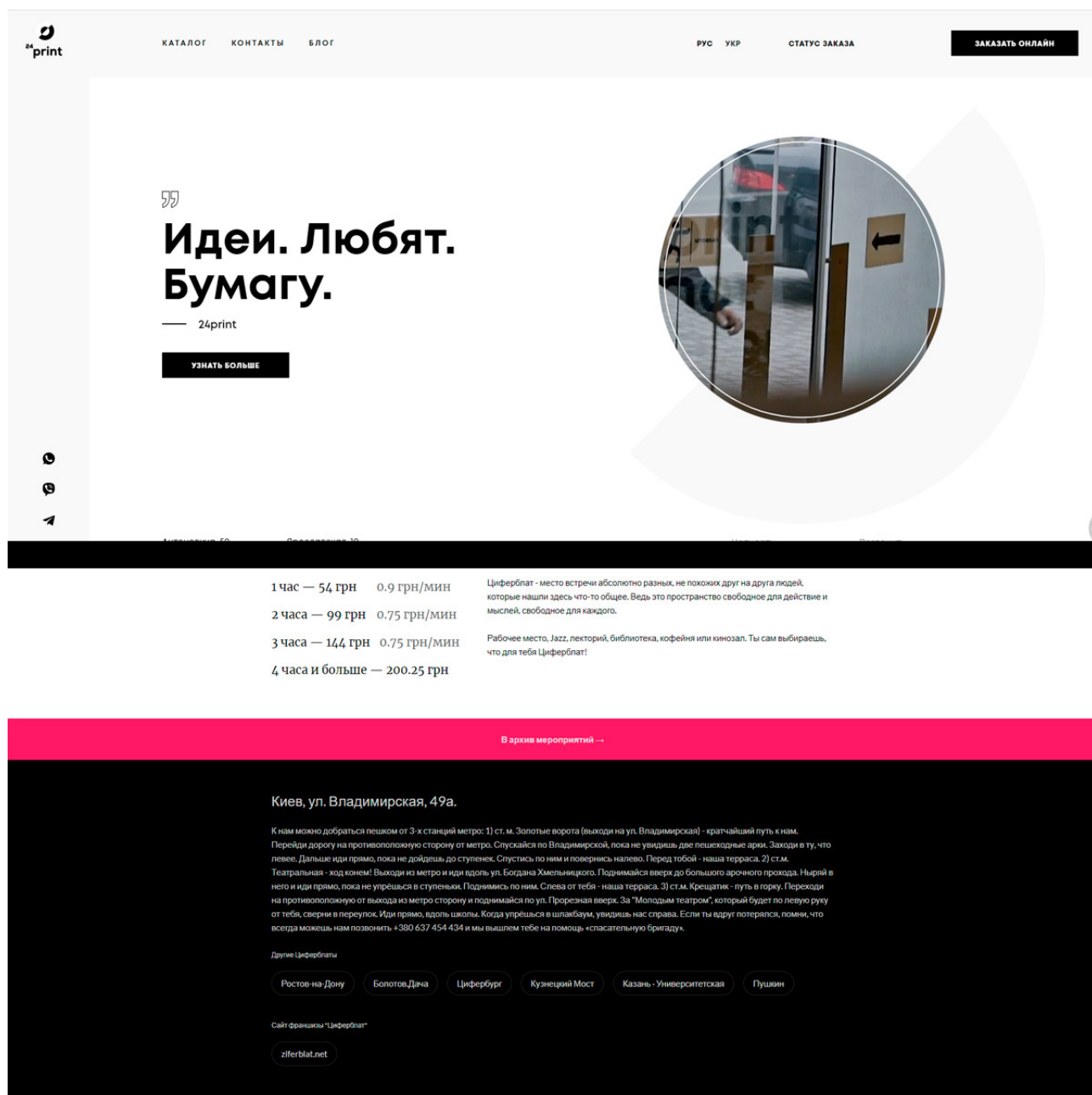


Figure 1. The samples of correct and incorrect black and white design used at the workshops

can conclude that task-oriented interface (that mostly uses various control elements with brief text patterns, like navigation panels, menus, buttons etc.) and content-driven interfaces (which usually include massive flowing paragraphs of text) need for applying different fonts which might be caused by our special ability to read the texts.

Covering the special physiological mechanism of perception of printed information is the task for another group of students. In particular, as an example of our practical experience of similar flipped-learning workshops, the students analyzed the resources to find out that the efficiency with which a person read is a function of the amount of text available to us during reading. In fact, there is a linear relationship between reading speed and the quantity of characters that are visible to the eye (if the perceptual

limit is up to 15–20 characters) [9]. The students managed to realize basic mechanisms of reading: human eyes do not move smoothly along the lines of the page (screen), instead they make discrete jumps between words, focusing on one word for a short period of time before making a parabolic jump to another one (as it is demonstrated on the figure 4).

The students also found out, that despite their non-linear nature, these eyes movements improve our reading capabilities. At the word processing within our focus, we use the additional information outside of the focused word to direct our reading. While reading, our time to comprehension is assisted by the sense of adjacent context, at the same time we often process automatically (just skip them)

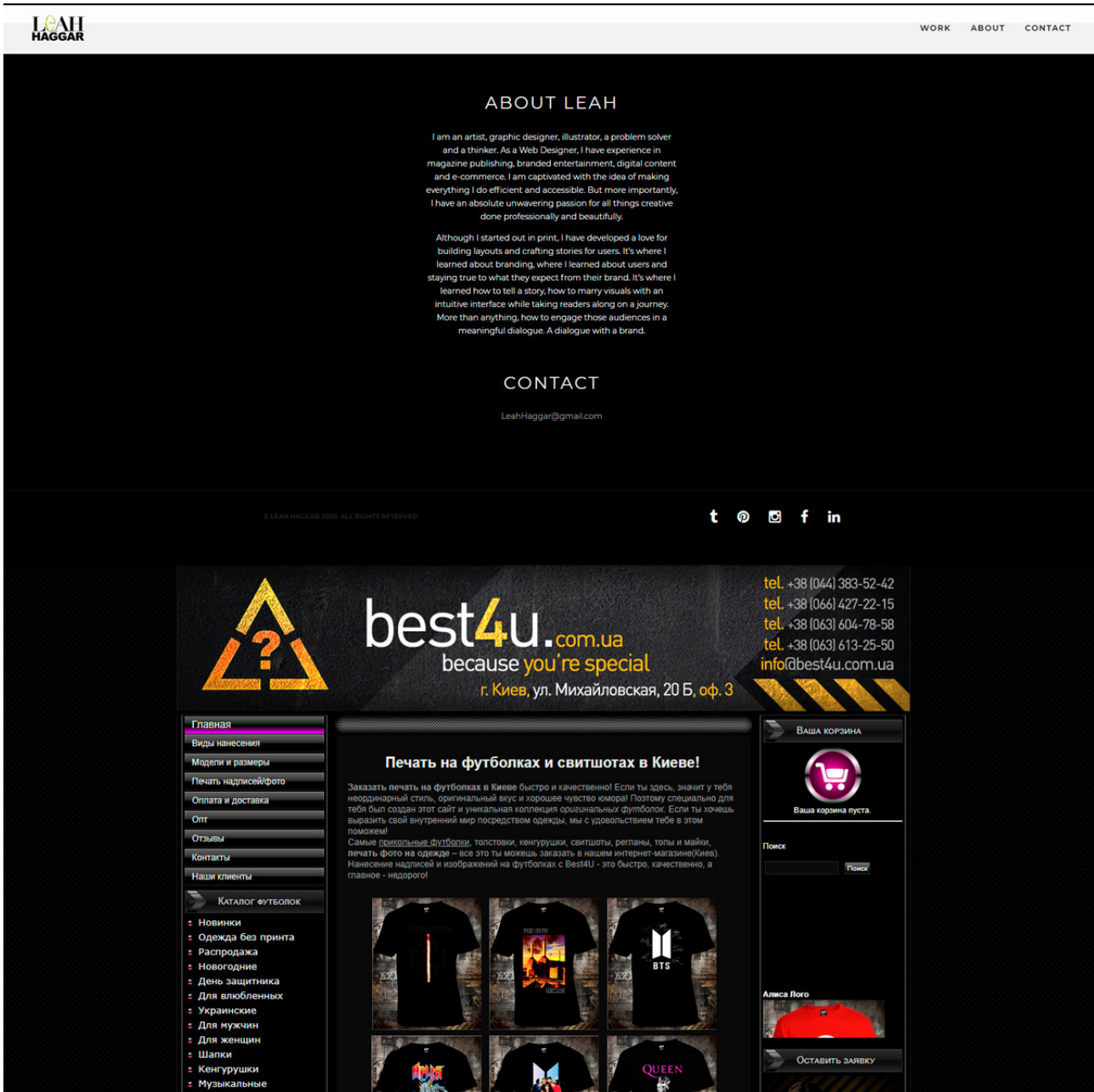


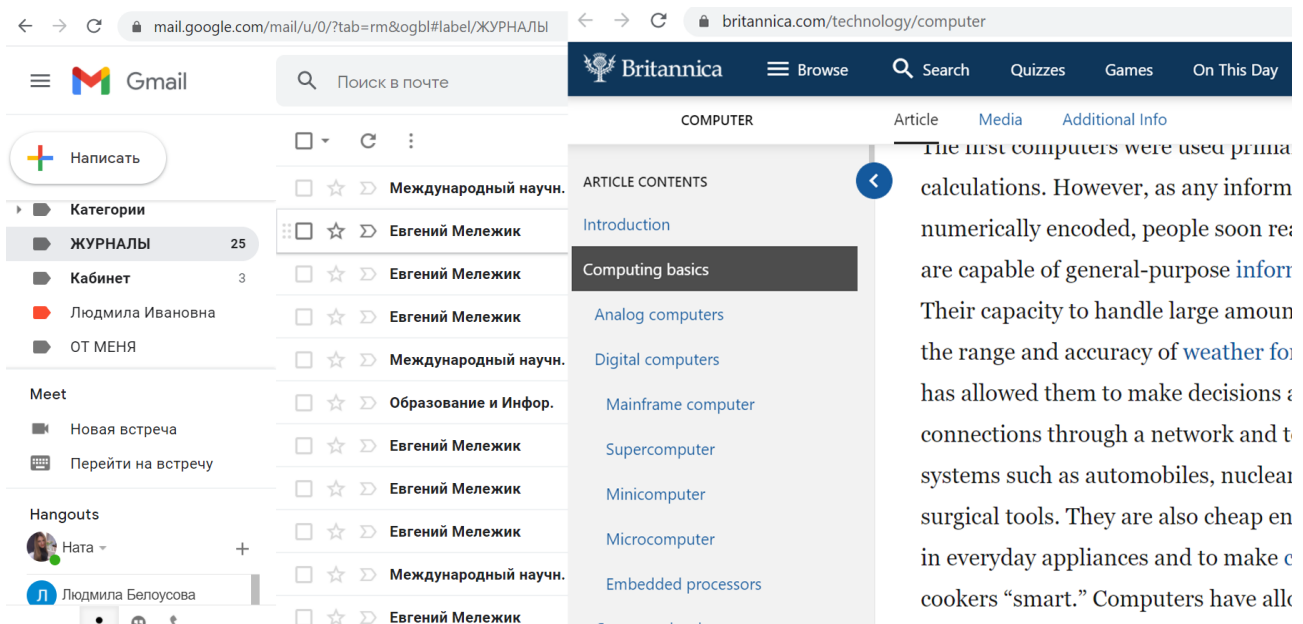
Figure 2. The samples of correct and incorrect design applying dark background used at the workshops

short functional words (prepositions, conjunctions, articles etc.).

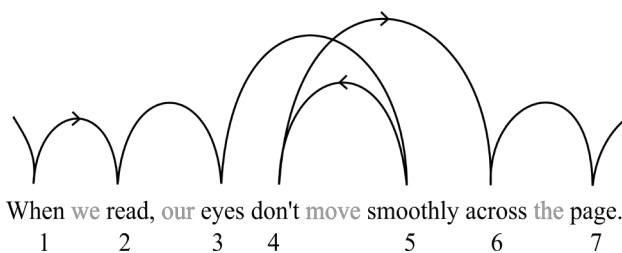
Understanding of these findings of cognitive psychology during common discussion at the flipped learning workshop led students to the conclusions that an isolated word (up to 20 characters) will be read more slowly than a word that forms part of a longer phrase. This conclusion, in turns, encouraged students to infer great affect on typographic decision-making for user interfaces: as task-oriented interface tends to collect more isolated words than content-driven one, we can not rely on the contextualizing effects of neighboring words to help improve comprehension of the labeled control elements of task-driven interface. Thus, students' awareness of this functional distinction and psychological peculiarities, obtained during

such a workshop, can help narrow their focus on providing a set of meaningful constraints. Finally, it can help students make more intelligent decisions about fonts choosing, which then is going to be used by the them while mastering the basics of graphic interface design.

The second module "Basics of the design of graphic interface" provides a trainee with both theoretical knowledge and practical skills which are in need for the creation of high-quality graphical interface. In particular, it is deeply learnt the spectrum of essential design concepts and techniques: coloristic, font, typography, composition, bootstraps etc. It is also discussed the ways how to highlight the most important elements, to display logical connections between individual elements, to use visual anchors. Principles of visual design, basic qualities and char-



**Figure 3.** Samples of task-oriented (on the left) and content-oriented (on the right) interfaces



**Figure 4.** Human eyes movements during reading

acteristics of creating a successful interface are mastered by the students within the module.

Besides lectures, the main forms of work within the module are workshops where students learn theoretical material, prepare presentations on the learnt topics and take part in their discussion. For the module content learning at the workshops, specially developed visual aids are used which demonstrate the examples of interface design made with different choice of composition, color, fonts etc. The students are involved in their comparing, critical analysis and estimation of all the variants.

For example, during mastering basic principles involved in the use of the visible language (such as: organize, economize, communicate) it is beneficial to offer for students' analysis chaotic and ordered screen layout; reasonable and unreasonable samples of linking related items and disassociating unrelated items; poor design as for navigation around the site which contrasts with improved design where right layout and color grouping help focus user's attention to most important title areas, and bulleted items guide the user through the secondary areas.

Besides, the trainees are offered to do the set of practical tasks on interface design development with its further analysis and discussion. In particular, the psycho-

logical techniques learnt by students at the first module are worked out at the workshops of the second module. We would like to share our practical experience of using specially developed card game "Mental Notes" focused on the involving the trainees in the analysis of applying various psychological techniques to the interface design of their potential web application. Original card deck Mental Notes, created by S. Anderson [10] consists of over 50 insights from psychology which make easy reference and brainstorming tool. Each card describes one insight into human behavior and suggests ways to apply this to the UI design of software applications. We adapted original cards and transformed them into didactic game.

At the preparation stage of the game all the students are assigned the topic of their potential web application. They are given time to think over its possible application users, purpose, functions etc. Then the game starts. The students in turn take a card which represents and describe this or that psychological technique (insight) used in the modern practice of UI design. Some examples of these cards representing, in particular, such techniques as social proof, curiosity, regularity establishing, reciprocity etc., are given in the figure 5.

The students analyze the technique given in the card, the in turns make and prove their decision as for how they are going to use these exact technique at the UI design of the future web application: which visual language and how they are going to apply; how and which means of color, typography and graphical images are relevant to use and why; why such a technique is going to be beneficial exactly for this application.

After the game students obtain the whole deck of the mental cards with different psychological techniques. They are encouraged to apply at least five of them in the UI design of their prototype.



## Соціальний доказ

*У незнайомих для нас ситуаціях ми схильні наслідувати приклад більшості*

Знайдіть цікаві способи показати соціальну активність на сайті. Це ненав'язливо підкаже користувачеві, як себе вести, і допоможе в прийнятті рішень. Наприклад, ви можете привести статистику (кількість позначок «Мені подобається», переглядів і коментарів), опублікувати позитивні відгуки і максимально прозоро показати дії інших користувачів і їх досягнення (рейтинг, карма).



<https://www.youtube.com/watch?list=PL761EA91DDBDF2B27&v=3J85SUZFXNM>

## Цікавість

*Зацікавлені цікавим фактом, люди охоче прагнуть дізнатися більше*

Чи не розкривайте всі карти відразу! Розкажіть рівно стільки, скільки потрібно, щоб користувач захотів зробити наступний крок. Підтримуйте його інтерес несподіваними ходами: нехай для нього це буде захоплюючим пазлом, а для вас - шансом швидко і просто ввести його в курс справи.



## Принцип впізнавання через нагадування

*Впізнавання знайомої інформації дається нашому мозку легше, ніж відтворення її «з нуля» по пам'яті*

Спростіть процес взаємодії з сайтом - запропонуйте користувачеві готові рішення і варіанти відповіді. Постарайтеся доповнити порожні поля форми випадковими списками з варіантами, або використовуйте запитання, наприклад «Множинний вибір». Це спростить взаємодію з сайтом до одного кліка миші.



**Figure 5.** Selected cards used for the game Mental Notes

The third module “Instrumental interface design” is oriented on the mastering some universal tool environments for interface development. There are a lot of them nowadays on the market. However, the most universal and prospective one seems to be Figma environment. According to experts [11], Figma is a web-based design instrument allowing to create mockups, interactive animations, and high-fidelity prototypes. In addition, Figma provides version control, collaboration features, presentation mode, code generation, which makes it really attractive and professional environment for design projects. The environ-

ment supplies a designer with all essential tools for prototype development along with all the workable graphical elements that enables to imitate the functionality of the future digital product, which is significant for potential designers’ training. Despite the fact that on the Internet nowadays there are a lot of practical recommendations, instructions and lessons on mastering Figma facilities, it is felt the lack of systematized didactic materials focused on the step-by-step learning in the lines of efficient design of various software interfaces which can be used successfully during university training of different specialists.

Thus, the third module of invariant part of the UX/UI design curriculum is relevant to focus on the main facilities of Figma, and provide the students with skills to create and test efficiently the prototype of the digital product applying all the theoretical concepts which were learnt in the first two modules. Here it would be recommended to offer students the set of practical classes within the environment to master both basic tools and advanced Figma facilities including their extension by programming.

Below we are giving some sets of tasks which can be beneficial for mastering Figma facilities in the context of theoretical universal basis for the design mastering, presented in the two previous modules. In particular, after the students’ getting familiar with main options of Figma interface, tools, navigation techniques etc., we encourage them to learn deeply peculiarities of color representation in different color systems and their influence on the power of interface elements. The samples of practical tasks offered to the students are given below.

*Practical task 1.*

1. Create a frame
2. Inside the frame, create one square and fill it with blue R (0) G (120) B (240).
3. Create two more identical squares by duplication.
4. Learn the peculiarities of the perception of the same color R (0) G (120) B (240) in the RGB system relatively to the saturation in percent.
5. Create another triple of squares (circles) and experiment with another RGB combination and saturation. Draw conclusions.

*Practical task 2.*

6. Create a new page and frame on it.
7. Inside the frame, create any shape and fill it with any color in the HSB system: H (hue – shade in degrees) S (saturation – saturation in percent) B (brightness – brightness in percent).
8. Create a group of shapes by duplicating.
9. Learn the peculiarities of the perception of **the same color in the HSB system** depending on the change of H at values of: H = 210, 240, 260; H = 360; 0; 20.

10. Learn the peculiarities of the perception of **the same color in the HSB system** depending on the change of Saturation (separately), on the change in Brightness (separately) and on the Saturation and Brightness together. Episodes of students' work upon exercise 9 are given below in the figure 6.
11. Find out information on the Internet about the emotional impact of colors.
12. Create a set of figures that regulate the psychological state (mood). Investigate the dependence of mood and emotions on the "temperature" of colors. Put the results of your investigations into the table. How the results of your investigations may be used at interface design in the context of their psychological impact on user's behavior within the interface? Make conclusions.

Other practical tasks can include more complicated exercises in Figma directed on both mastering its facilities and working out some stages of UX/UI design and its basic principles discussed at theoretical classes.

In addition, it would be beneficial to involve students into project-oriented activity in order to apply obtained knowledge and skills in their complex, and try them on the more complicated tasks.

Variable part of the said training (the forth module) is relevant to focus on mastering of the instruments of design which are applicable to solving more specific design problems as well as the tools of less universal and desktop environments (such as InVision, Adobe XD, Sketch, Adobe Photoshop, Adobe Illustrator etc.)[10].

The modules depicted above can make either the entire academic discipline of the different specialists' curriculum or they can be included into the other existing courses for training the specialists whose expertise covers various fields including media, marketing, advertising, publishing industry and others.

In addition to practical tasks, students performed project-oriented practice-oriented tasks. In the process of completing such tasks, students had to: develop a prototype of the future site (the type of site was taken into account: landing page, business card site, full-fledged site, etc.); think over a color palette and choose fonts; to develop a logo for the site; select information content using information coding to reduce the amount of information that the user must perceive at a certain time; implement a project using Figma. The figure below shows the project of the Zoo site, developed for the client's private zoo (figure 7).

## 4 Conclusions

In accordance with the aims of the paper, it is covered the approaches to the creation of the content of pre-service

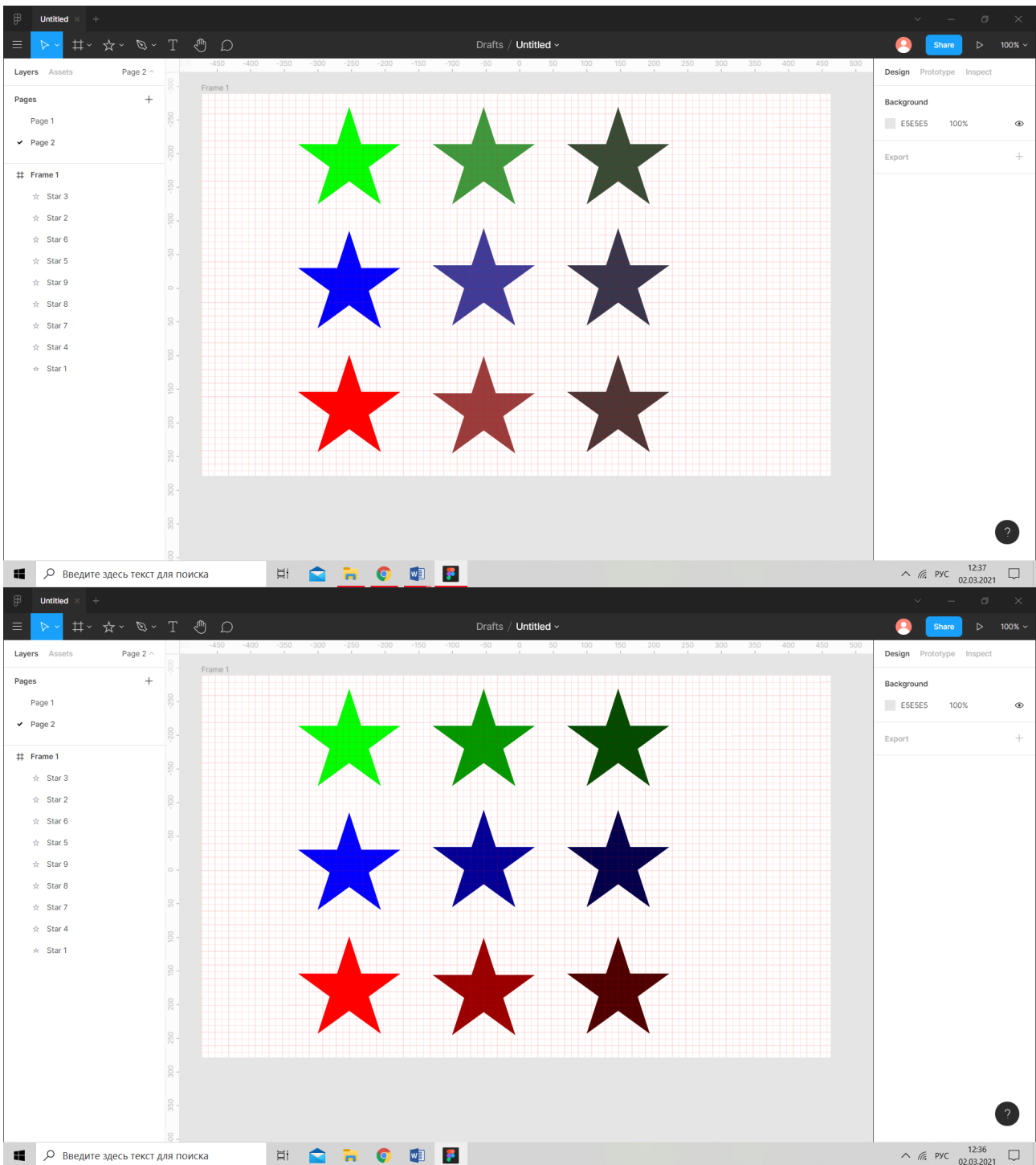
specialists' training on the fundamentals of UX/UI-design. The significance of the said fundamentals learning in the process of various specialists' training is discussed. Theoretical background of the work is made by the analysis of the importance of the user interface design in the process of developing of any digital product, and by the revealing the role of the fundamentals of UX/UI design in the vocational training of different specialists.

It is proposed the practically-driven approach to the curriculum building for the said training. It is distinguished invariant and variable parts in the curriculum. The content of three core modules which make invariant part of the curriculum is presented. Some relevant forms of work with students are offered within each module.

The prospects of the work make the preparation and doing empirical research directed on the verification of the offered approach to the curriculum building in the process of different specialists' training.

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**Figure 6.** Practical task 3

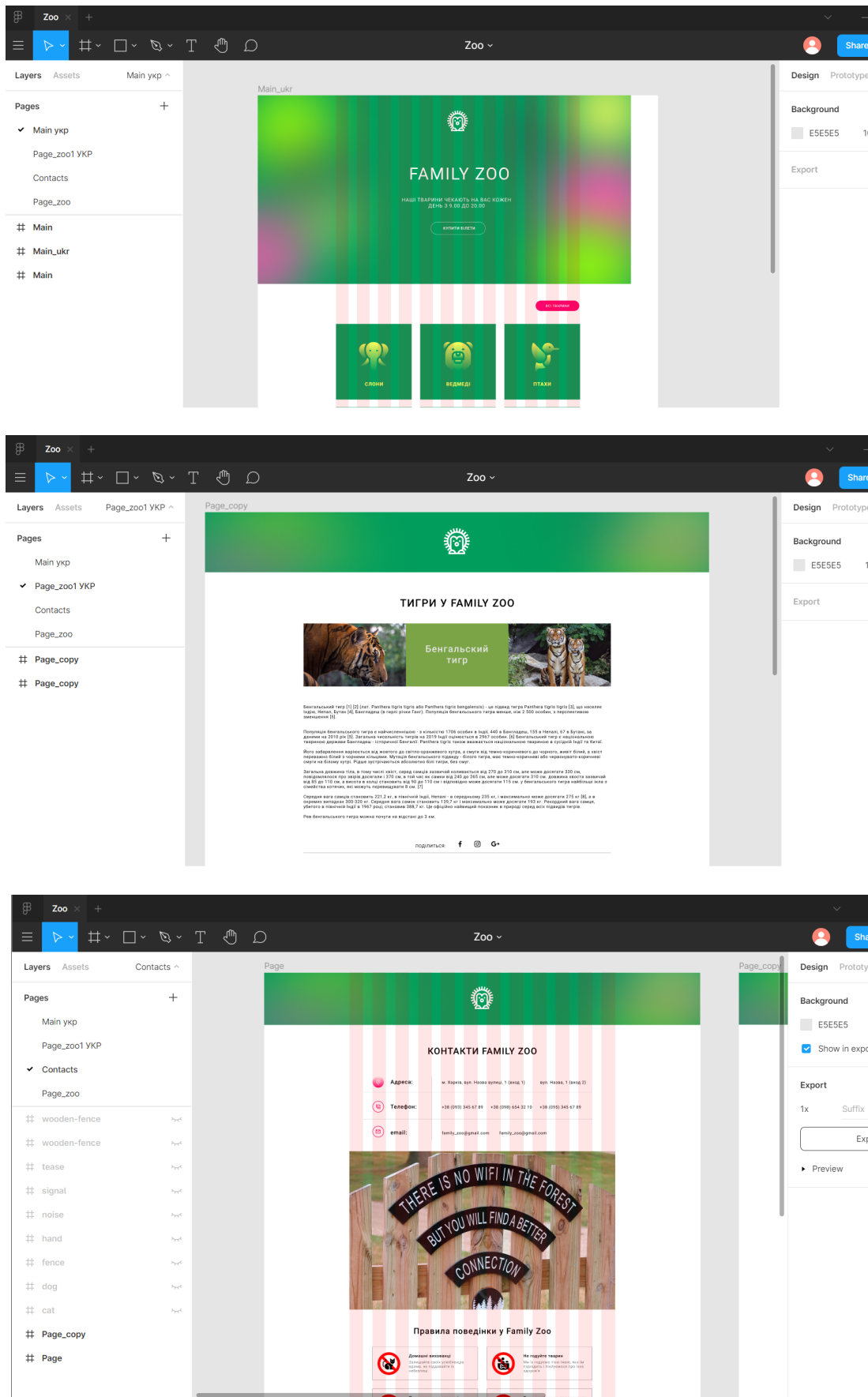


Figure 7. Zoo site project



# Principles of effective functioning of training system of future teachers of natural science and mathematics for STEM technologies usage

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**Abstract.** The issue of the training of future teachers of natural science and mathematics to using STEM technologies was discussed on the basis of the system of scientific analysis. The article describes several severities of the process of training future teachers of natural science and mathematics and organization of making use of STEM technologies based on project priorities and application-oriented study methods, connected with modern technologies and also supplying them by social connection in a professional environment. The assembly of the principles of the effectiveness of the training system referred to above shall be defined and described in the following paragraphs.

## 1 Introduction

Modern civilizational processes, both in Ukraine and around the world, show a strong increase in the influence of information and technological factors on social communication. Besides, the role of these processes is gradually increasing in almost all social and manufacturing areas, specifically in education. Just in this area, rapid modernization and reform of the project and objective of academic influence are taken into account. STEM, which is also called a unique educational phenomenon, which for its form integrates global achievements into science, technology, engineering, and modern mathematics, is the part of this point. This fact affirms the need to improve the vocational training of future teachers of natural sciences and mathematics, who can be oriented towards creating the will to use the technological issues of STEM education. In order to ensure the effectiveness of the training system for teachers of natural science and mathematics in the use of STEM technologies in the educational process, it is necessary to define and scientifically support the scientific basis of a set of principles for its application. The system of preparing teachers of natural science and mathematics for the application of STEM technologies must meet the needs of society and solve the problems it faces. These challenges are common to all countries, including Ukraine [1–7]:

- reduced interest in the exact profession of science and engineering,
- growing demand for qualified technicians and researchers,

- the development of production on the basis of the introduction of the latest equipment, technologies, and materials,
- increasing employers' needs in terms of technological qualifications of workers,
- the development of STEM industry and the emergence of new professions in this field.

## 2 Related Works

The training process of future teachers of natural science and mathematics in the context of the application of STEM education also has certain features.

First, it is impossible to implement interdisciplinarity as long as the future teacher of natural sciences and mathematics does not acquire an in-depth knowledge of the disciplines from which integration takes place [8], so in the program of training teachers of natural sciences and mathematics to use the basic disciplines STEM technologies must precede all others, and sufficient time must be given to master them [9–11].

Secondly, there is a need for practical experience, especially in the implementation of project activities [12, 13]. This experience is acquired by the future teacher in the realization of different exercises, through independent work in laboratory classes and practices, in different types of repetition [14], as well as through the realization of project activities during the training, which encourages them to think about the problems related to their training [15]. As a result, future teachers acquire teamwork experience and research approach to learning the world around them, thus forming the appropriate components of the readiness studied. As a result, the project activity should “permeate” the entire process of preparing teachers

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of natural science and mathematics for the use of STEM technologies.

Thirdly, it is very important to socialize and adapt to the future teachers of natural science and mathematics in the professional environment, which will enable him to form appropriate professional behavior, compare himself or herself to other teachers, and encourage further learning. Therefore, in the training of teachers of natural science and mathematics for the use of STEM technologies, it is necessary to ensure appropriate social interaction in the professional environment.

Fourthly, the effectiveness of training of teachers of natural science and mathematics depends entirely on the level of training of its sphere of the motivation of value [16–20]. Therefore, it is necessary to create an appropriate motivational fund, stimulating their psychological readiness to learn, as well as to form an active and positive attitude towards technology in future professional activities.

The concept of “learning principles” is considered to be “a system of basic teaching requirements for the organization of the educational process, which ensures its effectiveness” [21]. At the same time, it is fundamental ideas, initial provisions determining the content, forms, and methods of educational work according to the purpose of education and the laws of the educational process [22, 23].

Thus, the principles of education will be regarded as regulations that determine the requirements for the organization of the training system for teachers of natural science and mathematics to the use of STEM technologies, whose compliance ensures its effectiveness.

### 3 Results of the research

In order to determine all the principles for the organization of the training system for teachers of natural science and mathematics for the use of STEM technologies, it is necessary to take into account the requirements of the principles as a scientific category [24]:

- the formulation of the principles should take into account objectively existing pedagogical models and trends objectively existing in the development of the phenomenon under consideration,
- all principles should aim at solving the research problem while determining its general direction, guidelines, and strategy for the implementation of the research process,
- the principles should act as a system training factor affecting all components of the training system for teachers in natural sciences and mathematics and ensuring their functioning as a system,
- the principles should reveal various aspects of the preparation of future teachers of natural science and mathematics for the application of STEM technologies,
- each principle must be complementary to the others.

In the context of our study, is interesting, which, depending on the key elements and stages of the education process, has identified principles that will contribute to the

effective implementation of STEM education in Ukraine [25]:

- aims and objectives of training (focusing on practical purposes and clarity),
- involvement of students (personalization, interaction, and outcome),
- training of learning contents (interconnection, integration and modularity),
- organization of training (practice training, technology, continuity, and adaptation).

Based on the research methodology outlined, as well as on the basis of our own vision of the phenomenon studied, we have identified a set of principles that will contribute to the effective implementation of the training system for future teachers of natural science and mathematics to apply STEM technology in professional activities. Consider these principles in greater detail and determine the requirements for the implementation of the training system for future teachers of natural science and mathematics for the use of STEM technologies in professional activities.

1. Thus, the *principle of personalization* in the training of the future Masters in Science and Mathematics for the use of STEM technology in professional activities implies taking into account the individual psychological characteristics, age and other individual characteristics (personal experience, feelings, emotions, actions) of any future teachers of natural science and mathematics. According to this principle, every future teacher of natural sciences and mathematics actively participates in the construction of a personal educational path according to his own goals and abilities, feels an individual, a person who is the subject of learning [26].

At the same time, the attention of teachers should be focused not only on the formation of the knowledge of the future teacher, but also on taking into account the social and emotional aspects of his personality, ensuring the awareness of his both “weak” and “strong” characteristics, describing the areas of personal development. The principle of personalization also implies that communication and interaction between all participants in training take place in partnership [27–29]. Therefore, during training sessions and laboratory and practical work, any future teachers of natural science and mathematics should participate in the study of STEM according to their needs and abilities. The application of the principle of personalization makes it possible to optimize the professional training process of future teachers of natural science and mathematics on the basis of the personal needs and motivations of each future teacher, ensuring their effectiveness and efficiency.

2. The *principle of conscious cognitive activity* implies the formation of future teachers of natural science and mathematics a conscious attitude towards learning, understanding the general objective

of specific classes and tasks to achieve this objective, as well as the development of a strong desire for self-knowledge and self-improvement. It offers a meaningful and creative approach to mastering the knowledge necessary for the application of STEM technologies in other professional activities. The conscious cognitive activity of the future teachers of natural science and mathematics is facilitated by: the explanation of the purpose and tasks of the discipline and its modules; the importance of discipline (special courses) in solving the problems of the future professional activity; the use in the educational process of tasks that encourage analysis, synthesis, generalization, induction, deduction; the creation of positive emotions.

According to this principle, future teachers of natural sciences and mathematics should not be passive students, but should be interested in the educational process that they are consciously learning [30, 31]. Thus, taking into account the principle of conscious cognitive activity in the process of preparing future teachers of natural science and mathematics for the application of STEM technologies in professional activity, it is sent to train future teachers of conscious attitude towards an educational process as a process of knowledge of the surrounding reality, and also of conscious understanding of the material of the educational disciplines of the professional preparation program.

3. The *principle of self-organization* presupposes the need to change in the process of preparing the role of the future teachers of natural science and mathematics from “the one who teach” to “the one who learns”. In this case, the self-organization of the future teacher is directly linked to his/her self-education [32, 33] – one of the most important organizational forms of the educational process, which takes place without the participation of teachers and is led by the individual.

This principle is closely linked to the principle of conscious cognitive activity and is due to the need for future teachers of natural science and mathematics to organize their activities not only during training but also in other professional activities. The principle of self-organization also determines the need for the self-updating of future teachers of natural sciences and mathematics and the formation of their desire to identify and develop their skills.

In this case, self-updating provides the future teacher’s perception of reality, the objective of its evaluation system, the training of self-regulation capacity, self-analysis and self-control in educational activities [34].

Thus, taking into account the principle of self-organization in the process of training future teachers of natural science and mathematics for the application of STEM technologies in professional activities, it contributes to the activation, optimization

and improvement of the process of training and rationalization of the educational activities of future teachers. The effectiveness of each teacher’s educational activities depends mainly on personal preferences and efforts [35].

4. The *principle of the formation of valuable guidelines* presupposes the need to train future teachers of natural science and mathematics of relevant values, combined with the use of STEM technologies in future professional activities.

Compliance with this principle is extremely important for our study, because it is the value orientations that reflect the conscious attitude of future teachers of natural science and mathematics towards new professional activities in general and ensure their attention to the use of STEM technologies in particular. At the same time, the value guidelines also determine the personality orientation of the future teacher in order to creatively solve the problems of professional activity, as well as the constant improvement and development of self-education in the field of STEM education.

It is no less important that individual values and students’ knowledge are determined by each other. In other words, knowledge reflects the objects and phenomena of reality, and the orientations of value – the individual’s attitude towards them. Thus, in the structure of the guidelines of the value of personality act as a kind of coordination center, this determines their behavior and attitude towards the social environment [36, 37].

In view of the principle of the formation of valuable guidelines training in the process of preparing future teachers of natural sciences and mathematics for the use of STEM technologies in professional activities, it will ensure awareness of the dominant need for STEM technologies and allow them to set appropriate priorities to solve various professional tasks related to the implementation of STEM education.

5. The *principle of cooperation and mentoring* in the study process involves the organization of inter-subject relations, including teamwork and continuity in education, which is achieved through the exchange of experience in the use of STEM technologies in professional activities between teachers of free economic practice, experienced teachers and future teachers of natural sciences and mathematics.

On the basis of this principle, all actors should cooperate, form a coalition of more and less experts, actively share experience on the specificities of the practical application of STEM technologies on the basis of partnership, volunteering, transparency, openness, equality and mutual accountability [38, 39].

Therefore, taking into account the principle of cooperation and mentoring in the process of preparing

future teachers of natural science and mathematics for the application of STEM technologies in professional activities, it will ensure the participation of teachers-practices experienced in this process, creating inter-subjective links between them and future teachers of natural science and mathematics, as well as intensifying the exchange of experience in the application of STEM technologies in professional activities.

6. The *principle of dialogic* in the study process [40] presupposes the exceptional importance of dialogue for the formation of the future teachers of natural science and mathematics.

On the basis of this principle, the appropriate training of teachers of natural science and mathematics for the use of STEM technologies in professional activities can only be carried out through dialogue with free economic education teachers, expert-practical teachers and fellow graduates. The content of this dialogue is the exchange of experience in the application of STEM technologies and the joint production of new knowledge in this area.

It should be noted, however, that this principle does not provide for equality between the teacher, the teacher-practice and higher education, due to differences in age, life experience and different social roles [41]. Nevertheless, the principle of dialogic presupposes sincerity, mutual respect and tolerance for other people's opinions. Therefore, taking into account the principle of dialogic in the process of preparing future teachers of natural science and mathematics for the use of STEM technologies in professional activities, it will offer the possibility of exchanges between teachers of free economic sciences, teachers of natural sciences and mathematics and professionals as individuals and as future teachers.

7. The *principle of integration* implies the integration into the content of the training program of disciplines related to the use of STEM technologies and STEM education. In this case, integration should not be just a combination, but the interpenetration of two or more STEM disciplines. This will ensure the formation of an inclusive vision of future teachers of natural science and mathematics on STEM education and the use of STEM technologies in other professional activities.

According to this principle, the learning content should be linked to the STEM industry, its main disciplines in each course of study. The organic combination of the content of the training program for future STEM education informatics teachers, STEM technologies, STEM disciplines and other vocational and pedagogical orientation courses around a theme will provide an integral perception of educational material on different sides, multiform knowledge of STEM education, the development of criti-

cal thinking and value orientations important to the STEM industry.

8. The *principle of transdisciplinarity* is linked to the principle of integration and implies that the content of the training of teachers of natural science and mathematics for the application of STEM technology goes beyond a particular discipline, permeating different disciplines, which will transfer knowledge from one discipline to another.

Implementation of this principle is associated with the need to train in teachers of natural science and mathematics a meta-subject vision of the disciplines of the STEM industry, which is essential for STEM education and the use of STEM technology. To form a meta-subject vision in the training process of future teachers, it is necessary to use methods such as analysis, synthesis, generalization, definition, distribution, classification, etc.

In the maintenance of disciplines, it is necessary to provide: the transition from simple to difficult subjects, from concrete to general and, on the contrary, the conduct of theoretical of theoretical before those practices; methodologically justified alternation of theoretical and practical classes; the overall application of knowledge in the performance of various tasks.

Therefore, taking into account the principle of transdisciplinarity in the process of preparing teachers of natural science and mathematics for the use of STEM technologies, it provides effective training in the meta-subject vision of STEM education and STEM disciplines as a basis for the effective application of STEM technologies in subsequent professional activities.

9. The *principle of the link between learning and life* implies that the preparation content of future teachers of natural science and mathematics for the application of STEM technologies is correlated with the requirements of real life specialists.

According to this principle, during the development of any program of any discipline of training of future teachers of natural science and mathematics to its content, it is necessary to include topics intended to develop the required skills in the twenty-first century [42, 43].

At the same time, in forming this content, it is necessary to take into account the main tasks of the educational process in higher education, the specific vocational training tasks of teachers of natural science and mathematics, as well as the real possibilities of higher education.

Taking into account the principle of the link between learning and life in the process of preparing teachers of natural science and mathematics for the application of STEM technologies provides a consideration in the context of preparing real life requirements for professionals in the 21st century.



10. The *principle of significance of learning outcomes to the individual* implies that the expected outcomes and the purpose of preparing teachers of natural science and mathematics for the use of STEM technologies should individually include significant outcomes for each graduate educational outcome.

Based on this principle, each future teacher of natural sciences and mathematics seeks individual achievements in educational activities, because the personal results provide the meaning of any activity and the realization of one of the main needs – to succeed in learning, in professional activities and in life. No less important is the fact that the satisfaction of this need of the individual contributes to its self-up gradation, self-affirmation, increase the level of self-esteem and, in general, provides the humanization of the training process.

In order to implement this principle, it is necessary to create for future teachers of natural science and mathematics various successful situations in which they may experience a state of joy and satisfaction in achieving or overcoming the expected result [44].

The most effective thing for this is the use of problematic situations, the solution of which will allow the student of higher education to feel involved in what is happening in the classroom, as well as to increase the strength and efficiency of the knowledge acquired by him. A more comprehensive tool for creating successful situations is project technology, which aims to apply future natural science and mathematical disciplines teachers of existing factual knowledge and to acquire new knowledge.

Thus, taking into account the principle of significance of learning outcomes to the individual in the process of preparing future teachers of natural science and mathematics for the application of STEM technologies, it provides greater motivation for learning, allows the student to take advantage of educational activities, stimulates them to high learning, eliminates anxiety, uncertainty and low self-esteem, develops initiative, creativity and activity, as well as stimulates their self-organization and self-realization.

11. The *principle of feedback* implies the need to obtain timely information on the results of the training of teachers of natural science and mathematics to use STEM technologies in the form of assessment, documentation and diagnostic results.

The implementation of this principle enables freelance teachers to determine the correction of their actions during teaching, to obtain information on the conformity of training with the expectations of future teachers, to identify the complications that arise during the training, as well as the “weaknesses” and gaps in their preparation for using STEM technology.

Feedback in training not only carries out semantic but also emotional functions. The semantic function

determines the achievement by future teachers of natural and mathematical sciences of certain results of the formation according to the criteria of evaluation determined, and the emotional function allows to determine their state of mind during the formation and, if necessary, to eliminate negative trends in the relationship between the training subjects.

In order to provide feedback in the process of preparing teachers of natural science and mathematics for the use of STEM technologies, it is recommended to use anonymous questionnaires and reflections.

In particular, anonymous questionnaires are carried out either in the last lesson or after control of the module. This questionnaire provides much information on the effectiveness of certain teaching methods, students’ satisfaction with the learning process and its results during the semester, as well as the level of achievement of the learning target and the expected results. The results of the questionnaire are taken into account, but not as a final evaluation of the teacher’s work by future teachers [45]. During the reflection, which takes place constantly during the training, every future teacher of natural science and mathematics analyzes what is happening and draws its conclusions. Reflection helps the future teacher to achieve adequate self-esteem, to increase self-organization and self-motivation.

Thus, taking the principle of feedback into account in the training process of teachers of natural science and mathematics for the application of STEM technologies helps to understand the nature of the difficulties, gaps and “weaknesses” of this training, to determine the reasons for their occurrence, allowing the whole training process to be adjusted.

12. The *principle of constant control* implies the need for teachers, Methodists and curators working with future teachers of natural science and mathematics, regular and continuous diagnostic actions.

The control process consists of three main elements: establishment of standards; comparing the results with the established standards; and actions. According to this principle, in the training process it is necessary to evaluate not only the level of knowledge and skills, but also the level of training of other professionally significant personal characteristics which form the basis for future teachers of natural science and mathematics to apply STEM technologies in professional activities. This control will not only provide information on the initial state and final results of the preparation process studied, but also monitor current results. This principle is closely linked to the principle of feedback and determines the need to develop appropriate diagnostic tools to determine the level of preparation of the teachers of natural science and mathematics to use STEM technology for the relevant components of its content.

Thus, taking into account the principle of constant control in the process of preparing teachers of natural science and mathematics for the application of STEM technologies shows the progress of the planned task system allows eliminating deviations and provides an adaptation to change.

We believe that the implementation of a set of principles mentioned above will in practice allow the implementation of an effective training system for future teachers of natural science and mathematics for the use of STEM technologies in professional activities.

To gain experience, a future teacher must participate in the process of creative, search activity, since the experience of creative activity cannot be conveyed by stories, indications of the process itself, they are carried out together with students.

To develop the creative abilities of students, it is necessary to involve them in a specially organized educational scientific and cognitive process, which is a model of the scientific process of cognition. In this aspect, the use of interactive teaching methods provides planned results if students become carriers of specific roles; simulation-game situations create a real environment, the content is based on specific practical material that reflects the content of professional activity, providing a combination of training with the professional development of future specialists.

Fulfillment of specific roles obliges students to analyze and make professionally significant decisions, increases the level of their professional competence, including pedagogical.

Based on the analysis of scientific sources and based on the author's vision of the features of the studied phenomenon, in the necessary and sufficient organizational and pedagogical conditions that ensure the effectiveness of the process of training future teachers of natural science and mathematics for the use of STEM technologies, the following are attributed:

1. Updating the content of professional training of future teachers of natural science and mathematics to use STEM technologies.
2. Implementation of STEM projects in robotics by future teachers of natural science and mathematics.
3. Ensuring in the course of training future teachers of natural science and mathematics of their social interaction in a professional environment.

An important role in the organization of the process of training future teachers of natural science and mathematics is played by complex methodological support, which requires the determination of the regulatory framework, information and material and technical support of the educational process.

Therefore, in the course of preparing for the application of STEM technologies in professional activities, future teachers of natural science and mathematics get acquainted with methodological recommendations, regulations, instructions and other normative acts of the educational process. First of all, they become familiar with the

“Typical list of learning tools and equipment for educational and general purposes for classrooms of natural and mathematical subjects of general educational institutions”. Their use allows students to carry out design and research activities, to implement the tasks of modeling various processes and phenomena and consciously form qualitatively new transdisciplinary knowledge.

## 4 Conclusions and future work

On the basis of the study, we identified twelve principles, the respect of which will contribute to the effective implementation of the training system of future teachers of natural science and mathematics for the use of STEM technologies in professional activities. The set of principles that we define includes: the principle of personalization, the principle of conscious cognitive activity, the principle of self-organization, the principle of the formation of valuable guidelines, the principle of cooperation and mentorship, the principle of dialogic, the principle of integration, the principle of transdisciplinarity, the principle of the link between learning and life, the principle of significance of learning outcomes to the individual, the principle of feedback and the principle of constant control.

They create a proper basis for building a model for the training system of future teachers of natural science and mathematics for the use of STEM technologies.

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# Conditions of blended learning implementation in H. S. Skovoroda Kharkiv National Pedagogical University: experience of Physics and Mathematics Faculty

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**Abstract.** The entire education system of Ukraine in the realities of the COVID-19 pandemic in 2020 found itself in a situation of the challenge for the immediate implementation of distance learning in educational institutions of all levels. Despite the presence of a relatively large number of scientific studies on the features of distance education, they were not enough for its practical implementation. A blended form of learning requires a combination of asynchronous and synchronous modes of distance learning, finding optimal tools and ways to interact with students, adapting traditional methods of studying disciplines to new conditions, overcoming inequality of participants in the educational process in technical support, mastering digital technologies. Analysis of the experience of the Faculty of Physics and Mathematics at H. S. Skovoroda Kharkiv National Pedagogical University showed that the conditions for the introduction of blended learning in institutions of higher pedagogical education are: advanced training and appropriate retraining of teaching staff; building a model of blended learning as a starting point for distance learning; development of educational and methodical support of educational disciplines taking into account the requirements of blended learning; implementation of all elements of the educational process in blended learning; providing participants of the educational process with organizational, methodological, technical and psychological support.

## 1 Introduction

The entire education system of Ukraine in the realities of the COVID-19 pandemic in 2020 found itself in a situation of challenge for the immediate introduction of distance education in educational institutions of all levels [1–5].

Distance learning is one of the forms of learning that emerged and improved with the development of Internet technologies, and today has highlighted characteristics, principles and a number of theoretical and practical developments [6–21].

The organization of high-quality mass distance learning in higher education institutions is a complex and multifactorial process, which is now at the beginning of formation and development.

Despite the presence of a relatively large number of scientific studies on the features of distance education, they were not enough for its practical implementation.

## 2 Scientific investigations in the field

In the context of the COVID-19 pandemic, the organization of the educational process in higher education, including pedagogy, has undergone significant changes. Thus,

from September 1, 2020, the Ministry of Education and Science of Ukraine provided recommendations on the introduction of blended learning in institutions of professional higher and higher education [22–24].

Let's turn to the experience of foreign countries, where the organization of the educational process in universities on the basis of blended learning has been operating for a long time. It should be noted that blended learning is now popular because it has proven to be an effective approach to organizing the modern educational process, while adding value to a specially designed learning environment through the inclusion of online learning resources. Despite this growing interest, controversy continues over the definition of blended learning. As a result, teachers of higher education institutions understand this term differently, and evolve different approaches to the design of this educational process [25–28].

It should be noted that blended learning is the most effective method of teaching in education, especially in higher education. Blended learning pedagogy is based on the assumption that direct interaction has significant advantages, as well as on the understanding that the use of online teaching methods contributes to the formation of a high level of knowledge [29]. Blended learning is a mixture of traditional face-to-face and online learning, so learning takes place both in the classroom and online. It is important to note that the online component becomes a natural continuation of traditional learning in the class-

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room [30]. Based on the analysis of scientists, it is proved that blended learning is a new trend that provides significant benefits to students [31, 32].

In modern conditions, one of the best reasons for developing blended courses is that they ensure the viability of students who seek not only the flexibility of distance learning courses, but also want to have some personal contact with teachers and other students in the classroom. Blended learning transcends time, local, and cultural barriers and has created many enhanced opportunities for students and faculty [33, 34]. Therefore, blended learning represents a new educational paradigm [35].

The classification of approaches proposed by A. Alamyary, J. Sheard, A. Carbone is important for our study. Researchers have distributed the impact of blended learning at high, medium and low levels on the potential of curricula and their effectiveness in blended learning. The obtained positive results provided an opportunity for scientists to provide recommendations on when and how to use pedagogical approaches in the organization of blended learning [36].

According to N. Vernadakis, M. Giannousi, V. Derri, M. Michalopoulos, E. Kioumourtzoglou, blended learning environment is a hybrid of learning and online learning that includes some convenience of online courses without complete loss of personal preference. In their article, the researchers explored the impact of traditional and blended learning on students' achievements. Based on the results obtained, blended learning looks like an alternative teaching practice that should be adopted to help students improve their results [37].

Thus, M. J. Kintu, S. Zhu, E. Kagambe in their study through the analysis established the relationship between the psychological characteristics of students, the prerequisites of a specially created educational environment and learning results. The conclusion of scientist' multiple regression analysis have shown that effective organization of the educational process on the basis of blended learning involves using effective technology, online tools and personal support for each student [38]. This aspect was studied by O. Zhernovnikova, where the scientist singled out the psychological aspect of the implementation of distance learning technologies in the educational process of future teachers of mathematics on the basis of blended learning [39], and also defined the system of knowledge, skills conditions of blended learning [40].

A group of scientists from India are convinced that blended learning is a positive result of advanced learning technologies. The blended learning model for higher education proposed by scientists, where traditional lectures were taught only through e-learning, was successful for students because it was effectively adapted to the educational process [41].

Another group of scholars provides the results of their research on how teachers and students in the educational process can use the ePortfolio platform as a tool. Thus, A. G. Ambrose, H. L. Chen quite successfully integrated e-portfolios into counseling and mentoring programs [42].

The purpose of the article is to establish the conditions of blended learning implementation in institutions of higher pedagogical education.

### 3 Research results

2020 turned out to be a de facto crucial year for H. S. Skovoroda Kharkiv National Pedagogical University (KhNPU) for mastering and implementing distance and blended forms of education. Thus, in the spring semester of 2019-2020 at the Faculty of Physics and Mathematics a number of events were carried out:

- lectures and practical classes in mathematics, physics, computer science and psychological and pedagogical disciplines were deployed in full according to the schedule online;
- it was organized the implementation of Laboratory works in physical and computer science disciplines by students in virtual environments, their online broadcasts and video recordings were performed;
- all introductory and reporting conferences on pedagogical practices were held online;
- the defenses of term papers for all courses and specialties in accordance with the curriculum were organized online ;
- the examination session took place, and students of the final bachelor's course confidently passed the state certification;
- the creation of full-fledged distance courses on the Moodle LMS in accordance with the needs of the educational process has begun (figure 1).

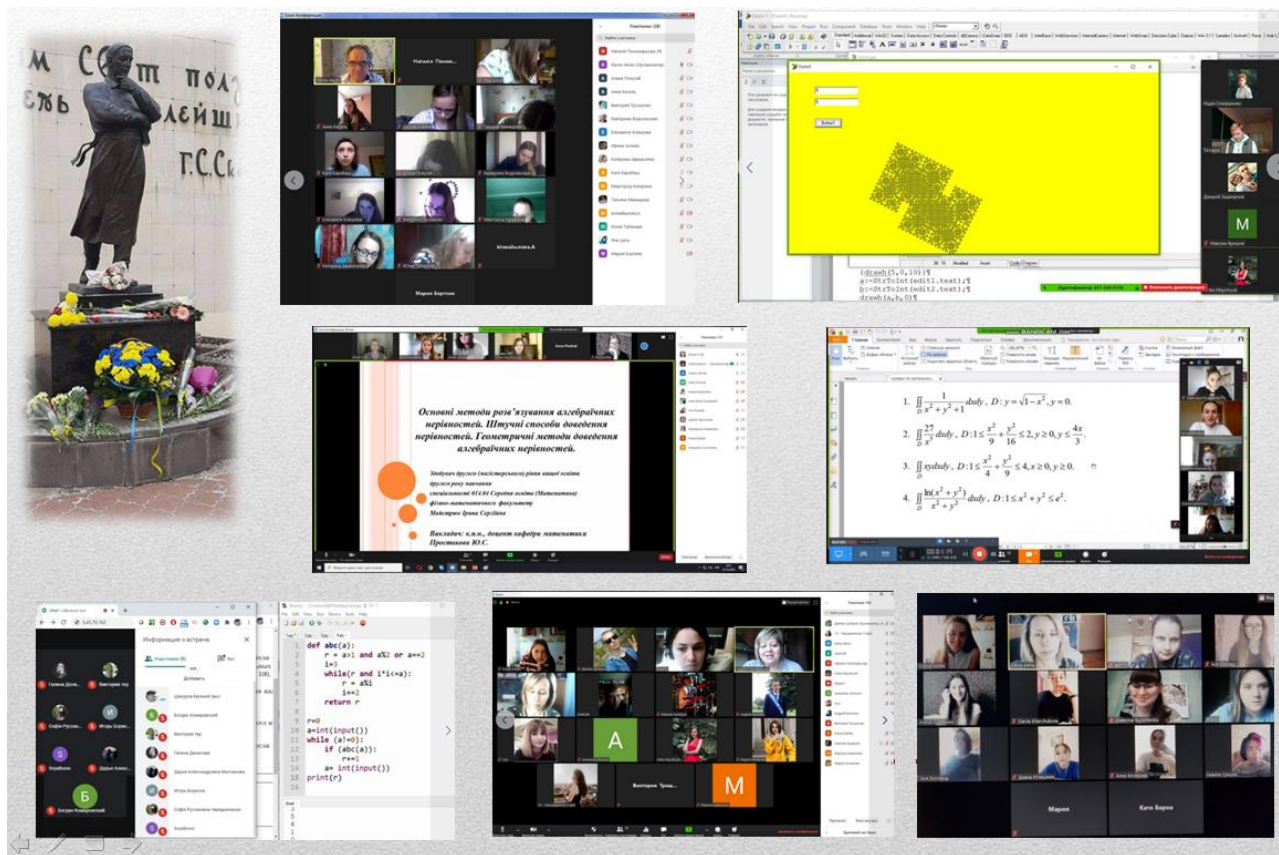
At the same time, the participants of the educational process faced a number of objective and subjective difficulties.

First of all, all employees had to master extremely quickly and at a high level only the latest digital competencies, as well as essentially innovative approaches to creating new models of learning.

The introduction of distance education for a long time is in the field of research interests of the teaching staff of the Physics and Mathematics Faculty and is reflected in the topics of dissertation researches, master's theses, term papers and other researches.

However, the retraining and advanced training of teachers and staff in the implementation of distance learning has begun since the spring semester.

Thus, all teachers of the Faculty have registered and in accordance with the registration schedule are internships of pedagogical and scientific-pedagogical staff of higher education institutions in distance education, organized on the basis of the Department of Information Technology of KhNPU. In addition, teachers of our faculty participate in online internships, courses, webinars, etc. on relevant topics with the receipt of certificates. We will especially note the online course "On distance and blended learning formats" for teachers and school leaders (project of the Ministry of Education and Science of Ukraine on the EdEra



**Figure 1.** Online classes at the Faculty of Physics and Mathematics

platform), online refresher courses “Cloud technologies in distance learning in quarantine” (based on Zhytomyr Polytechnic State University), international training (webinars) “Cloud services for online learning on the example of the platform Zoom”.

During the period from April to November 2020, 19 employees of the faculty received 45 certificates of advanced training in the relevant field (figure 2).

According to experts, distance learning is an organization of the educational process in which participants are distant from each other and interact using digital technologies.

For synchronous interaction, our teachers have mastered such popular platforms as Zoom, Microsoft Teams, Google Meet and others. Platforms such as Google Classroom, Edmodo, Moodle and other were used for asynchronous interaction of participants of the educational process at the faculty. Since the spring semester, the only reference point at the Faculty of Physics and Mathematics has been Moodle LMS. All teachers and students of the faculty are registered on the platform, have free access to it. Note that for the implementation of distance learning you also need to master special tools: electronic interactive whiteboard services, electronic resources for creating video lectures and collections of materials, to test knowledge and skills, creating quizzes, crosswords, puzzles, to create online demonstrations and simulations, tapes time, mind maps, etc.

From October 2020, due to quarantine restrictions, a blended form of education was introduced at the Faculty of Physics and Mathematics.

Blended form of education involves the organization of the educational process that combines distance and full-time learning (the use of distance learning technologies in full-time form).

Understanding blended learning as a learning model that provides students with certain elements of control over the study of the material and the ability to personalize learning, opens up much broader prospects for its effectiveness. The basis for the effective use of blended learning is the technological readiness of teachers, students and educational institutions, as well as a thorough methodological training of each discipline. It should be borne in mind that there are different models for the implementation of blended learning: rotary, flexible, self-blending, in-depth virtual. Blended learning is effective due to the complete adaptation to specific learning conditions, features of educational material and even the needs of a particular group. Therefore, depending on the capabilities of teachers and the capabilities of students within different disciplines, teachers choose the model that best helps to achieve learning results.

Accordingly, the content of distance learning courses on the Moodle LMS should be developed to support blended learning.





**Figure 2.** Examples of teachers' certificates

Educational material in various formats (texts, presentations, separate videos), materials for testing and questioning for tests and exams, etc. are focused not on creating independent distance courses, but on supporting the combination of synchronous and asynchronous mode of work, online and offline forms teaching.

As of December 1, 2020, a total of 159 courses of the departments of the Faculty of Physics and Mathematics at different stages of their development are presented on Moodle.

During the first semester of 2020–2021 academic year, the graduating departments of the Physics and Mathematics Faculty provide teaching of 66 disciplines (Department of Physics and Cyberphysical Systems – 16, Department of Mathematics – 31, Department of Informatics – 19), and the Department of Pedagogy – 21 disciplines for each which created and completed courses on Moodle LMS.

The scientific-methodical commission of the Faculty with the participation of the dean's office audited the content of the distance courses according to the following criteria: availability and quality of course summary (open summary of the course), work program, structured course by topics, lectures, assignments for practical or laboratory work, references.

The list of these audit criteria was discussed, established and approved by the Council of the Faculty of Physics and Mathematics. This list correlates with the list of requirements for distance learning courses proposed by the university management, while taking into account the needs of the blended form of education [43].

For example, the plan (course presentation, course structure information, learning algorithm) was excluded from the list of criteria at the internal audit stage as one that is inherent in the mostly asynchronous distance form.

As for the criterion of quality of educational material, it has its special weight and significance, therefore, if we do not take into account the purely technical requirements, in our opinion, its establishment requires a very careful expert assessment.

Courses were assessed by the degree of criterion's detection (0 – absent, 1 – entry level, 2 – intermediate level, 3 – high level).

According to the results of the audit, we obtained data that showed significant changes in the content of distance learning courses, compared to the previous semester. The analysis of the obtained data became the basis for setting benchmarks for further qualitative improvement of distance learning courses. The audit was an impetus to intensify the work of teachers on the courses, contributed to the exchange of departmental and personal experience of employees, the growth of their professional skills (table 1).

Thus, teachers place the following necessary components of distance courses on Moodle platform:

- work programs, syllabuses, course presentations, bibliography (with links to external resources, official websites and the university repository), etc;
- glossaries with full-text search and auto-binding;
- lecture materials on each topic, presentations and videos to them;

**Table 1.** Results of the audit of distance learning courses (percentage of courses with maximum score by criterion)

Department	Course	Summary	Work program	Structure	Lecture	Tasks	References
Physics	16	75.00	68.75	81.25	68.75	87.5	87.50
Mathematics	31	80.65	48.39	58.06	67.74	70.97	70.97
Informatics	18	88.89	50.00	100.00	83.33	88.89	77.78
Pedagogy	21	52.38	95.24	80.95	95.24	95.24	90.48

- materials to ensure different types of student activities: lesson, seminar, test, form, resource, tasks and others;
- materials for independent work;
- tasks for control in the form of modular tests and for self-control in the form of homework and test tasks;
- final control (exam or test).

The following courses deserve special attention, which are complete and original, the creative approach of teachers to the organization of distance learning (figure 3):

- “Pedagogy” (L. M. Kalashnikova and A. V. Boyarskaya-Khomenko, second year, Faculty of Physics and Mathematics, 50 classroom hours);
- “Object-oriented programming” (N. V. Olefirenko, second year, group 2I, 60 classroom hours);
- “General Physics and Astronomy” (V. V. Masych, third year, group 3M, 38 classroom hours);
- “Linear Algebra” (Y. S. Prostakova, first year, group 1M, 60 classroom hours).

The technology of students’ work on mastering academic disciplines in the conditions of blended learning with the use of distance courses at Moodle LMS provides:

- acquaintance of students with educational and methodical maintenance of discipline (educational and working program, quantity of lectures and practical employments, volume of material for independent studying and forms of reporting);
- consistent study by students of educational material distributed by meaningful modules. At the same time, during full-time study there is a main presentation and discussion of educational material (students who missed classes for good reasons, have the opportunity to read the syllabus, downloading it from the relevant section of the course). During the online training, the lesson is held in synchronous mode, followed by the placement of the processed materials (usually a presentation made in the PowerPoint) on the Moodle platform. Thus, students have the opportunity to continue the study on their own after discussing the material with the teacher, or to review individual parts of the lesson to better master some issues or when doing homework;
- performance by students of homework and tasks for control and independent works and their placement in the corresponding sections on Moodle LMS. This allows you to conveniently monitor the dynamics of students’ performance of relevant work, to give grades and store information about the points, to maintain contact with students and to respond in a timely manner and make adjustments to the learning process in case of problems.

In the conditions of blended learning it is important to ensure the implementation of all types of practices – pedagogical practice in general secondary education institutions, in institutions of specialized secondary education, in higher education institutions, scientific and pedagogical practice (figure 4).

The introduction of distance learning does not bypass the educational work with students as an integral part of the educational process, which is extremely important for the professional training of teachers-to-be. During the year, students of the Faculty of Physics and Mathematics not only actively participated in university-wide online events, but were also the initiators of some of them. Particularly popular were the projects “Stay at home”, “Easter”, online competition “StudVesna–2020, OnlineFest”, “Home University”, “Do not stay indifferent”, “Keep fit! Train at home!”, “Healthy lifestyle”, an online concert dedicated to the Day of the Education Worker, an online week of pedagogy and many others. The introduction of quarantine measures has activated and strengthened the importance of the work of academic group curators: they systematically hold briefings on distance learning, online meetings. At the beginning of the spring distance session, under the initiative of the academic group curators of the Faculty the flash mob “It’s easy if together!” aiming to support students was held.

Student’s research activities take place online as part of the professional training of teachers-to be. On November 24 and 25, 2020, the Faculty of Physics and Mathematics hosted the XVIII scientific-methodical conference of higher education students “Naumovsky readings”, which worked in five sections: mathematical studies (theory and practice, history and comparative studies), innovative technologies in educational practice, physics and cyberphysical systems, educational, pedagogical sciences. About 90 participants from 12 higher education institutions of Ukraine took part in the conference.

## 4 Discussion and conclusions

Blended form of learning requires a combination of asynchronous and synchronous modes of distance learning, finding optimal tools and ways to interact with students, adapting traditional methods of studying disciplines to new conditions, overcoming inequality of participants in the educational process in technical support, mastering digital technologies.

Analysis of the experience of the Faculty of Physics and Mathematics of KhNPU showed that the conditions for the introduction of blended learning in institutions of higher pedagogical education are:



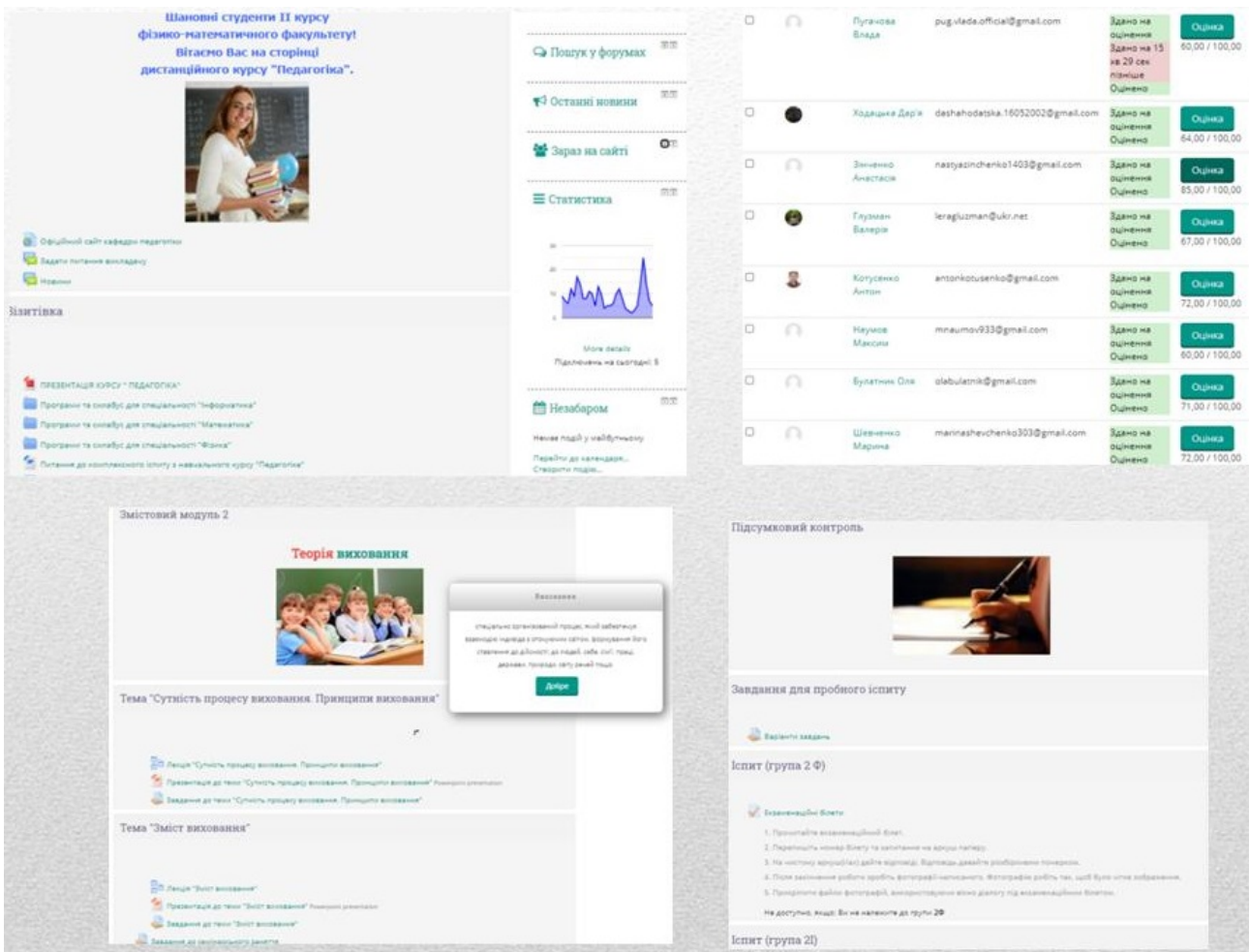


Figure 3. Examples of course materials

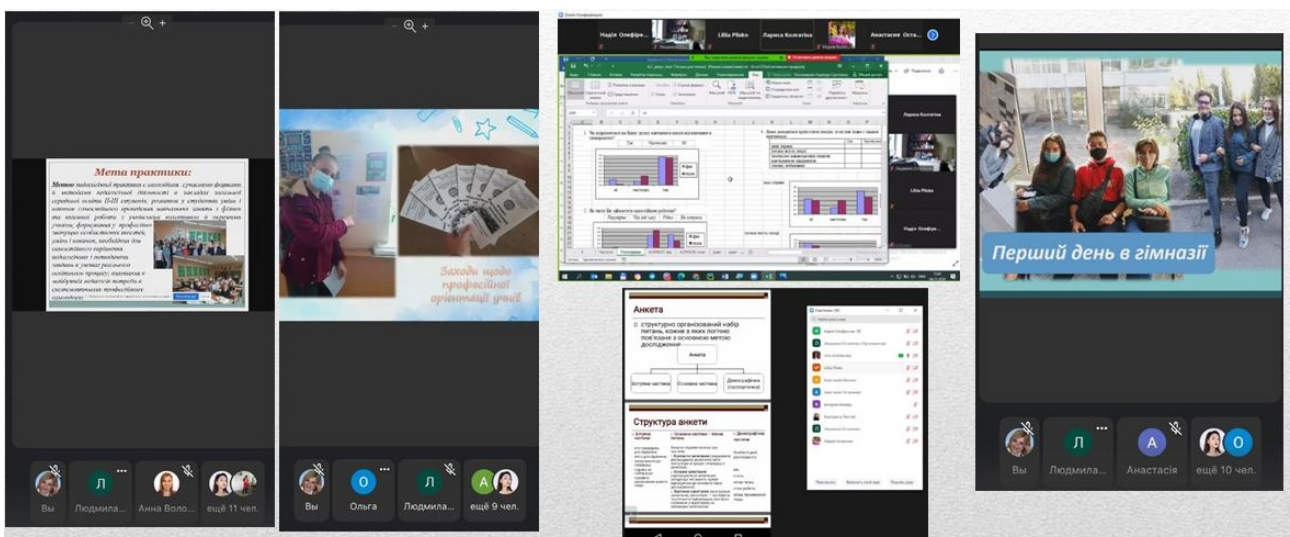


Figure 4. Online report on pedagogical practice

- advanced training and appropriate retraining of teaching staff;
- building a model of blended learning as a starting point for blended learning;
- development of educational and methodical support of educational disciplines taking into account the requirements of blended learning;
- coverage in blended learning of all elements of the educational process;
- providing participants of the educational process with organizational, methodological, technical and psychological support.

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## Digital intelligence of a modern economist: an exploratory case study

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**Abstract.** In the current context of digitalization of various spheres of life, an important characteristic of participants in a digital society is the level of their digital intelligence. The level at which future economists develop their digital intelligence skills during university depends on their successful employment and career development. The presented article analyses the concept of digital intelligence of an economist on the basis of the Digital Quotient framework developed by the Digital Intelligence Institute, characterizing the levels of “Digital Citizen”, “Digital Creator”, “Digital Entrepreneur” for such components of digital intelligence as: Digital Changemaker Identity, Digital Use, Safety Digital, Digital Security, Digital Emotional Intelligence, Digital Communication, Digital Literacy, Digital Rights. For the first time, the contents of an academic discipline of a university training programme for future economists have been proposed, in the course of which digital intelligence skills can be developed. The authors demonstrate the stages of formation, indicators for different levels of formation, content and examples of educational representation of material. They offer the stages of Digital intelligence development in the framework of studying the course modules, the implementation of project work and the solution of the real case studies during academic training. The results of the pilot study for achieving all three levels of digital intelligence. A statistical analysis of the results of the experiment was carried out and their relevance proved.

### 1 Introduction

The modern economy requires the digitization of economic processes, which is the basis of innovative development of economic systems. Digital economy is creating new products, shaping new needs, and the speed and volume of information is increasing day by day. The development of digital intelligence among economic actors offers significant opportunities to create and conduct business based on new technological solutions or business models not previously applied. At the current stage of the development of the global economy, digital tools were accompanying all aspects of economic activity, and digital data technology and e-business were receiving increasing attention.

The use of digital technologies is transforming the relations between the participants of economic activity in its various sectors. That is why the formation and development of digital competences in economists, both general and professional, is an important task for modern universities in preparing future economists and improving their skills. International and European institutions pay great attention to the development of standards of digital competence, in particular, the framework of digital intelligence provides the ability to adequately use digital technologies to work with data, management information systems, economic risks, provide cybersecurity, digital communication and more. The development of such abilities among future economists needs to take place both during the train-

ing of information technology disciplines and in professionally oriented (vocational) academic disciplines. It is therefore necessary to develop the content, methods and forms for the formation and development of digital intelligence skills of future economists during university studies through appropriate educational programs.

Digital skills are one of the most important conditions for the development of the digital market in any country, as they are directly or indirectly linked to all spheres of society and the economy. Significant work has been done by the European community to create the potential for digital transformation of education, in particular, to change the skills and competences requirements for citizens. The work was focused on developing a digital competency framework for citizens (DigComp), educators (DigCompEdu), educational organizations (DigCompOrg) and consumers (DigCompConsumers). Digital competences, computer skills, information literacy and related abilities represent a crucial element in ICT education (Information and Communication Technologies) [1]. Digital competence is a basic skill for citizens and should be systematically assessed, taking into account characteristics such as knowledge, skills and attitudes [2].

Any framework of digital competence presented necessarily requires mastery of the components of digital intelligence. Y. Park [3] defines digital intelligence as a set of social, emotional and cognitive abilities that allow individuals to meet challenges and adapt to the requirements of digital life. By acknowledging conceptual dyad, digital intelligence could be a result of the process of digital learn-

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ing [4]. Since digital technologies support the learning process and have become an educational subject as well as teaching content, the development of digital intelligence is encouraged in contemporary students [5].

Today's education is best met by the concept of digital intelligence development that includes eight interconnected areas: digital identity, digital use, digital safety, digital security, digital emotional intelligence, digital communication, digital literacy, and digital rights [6]. D. Cismaru, P. Gazzola, R. S. Ciochina, C. Leovaridis [7] explores the development of four categories of skills (operational, informational, strategic and digital fluency) as dimensions of the digital intelligence.

Entrepreneurs are often pressed to create and launch products and services as quickly as possible to achieve a first-mover advantage in the market. In doing so, they tend to overlook cybersecurity threats and risks due to a lack of awareness and insufficient funding. This can lead to theft of intellectual property, project failure, and inaccurate risk assessment [8].

*The purpose* of the article is to define the notions, components, levels and characteristics of digital intelligence of the modern economist, to develop approaches to the formation and development of components of digital intelligence of future economists in higher education.

## 2 Digital intelligence of a modern economist: structure, indicators, levels

Digital economy is based on information and communication and digital technologies, the rapid development and spread of which are already affecting the traditional (physical – analogue) economy, transforming it from a resource-consuming economy to a resource-creating economy [9–11]. Data are the key resource of the digital economy, generated and enabled by electronic communications through the operation of digital devices, tools and systems. In order to achieve digital competitiveness in the digital economy, it is necessary to develop the digital intelligence skills in a future economist.

Similar to IQ and EQ, which are used to measure general and emotional intelligence, digital skills are DQ (Digital Quotient), which is digital intelligence. The DQ framework contains 3 levels of digital intelligence [12]:

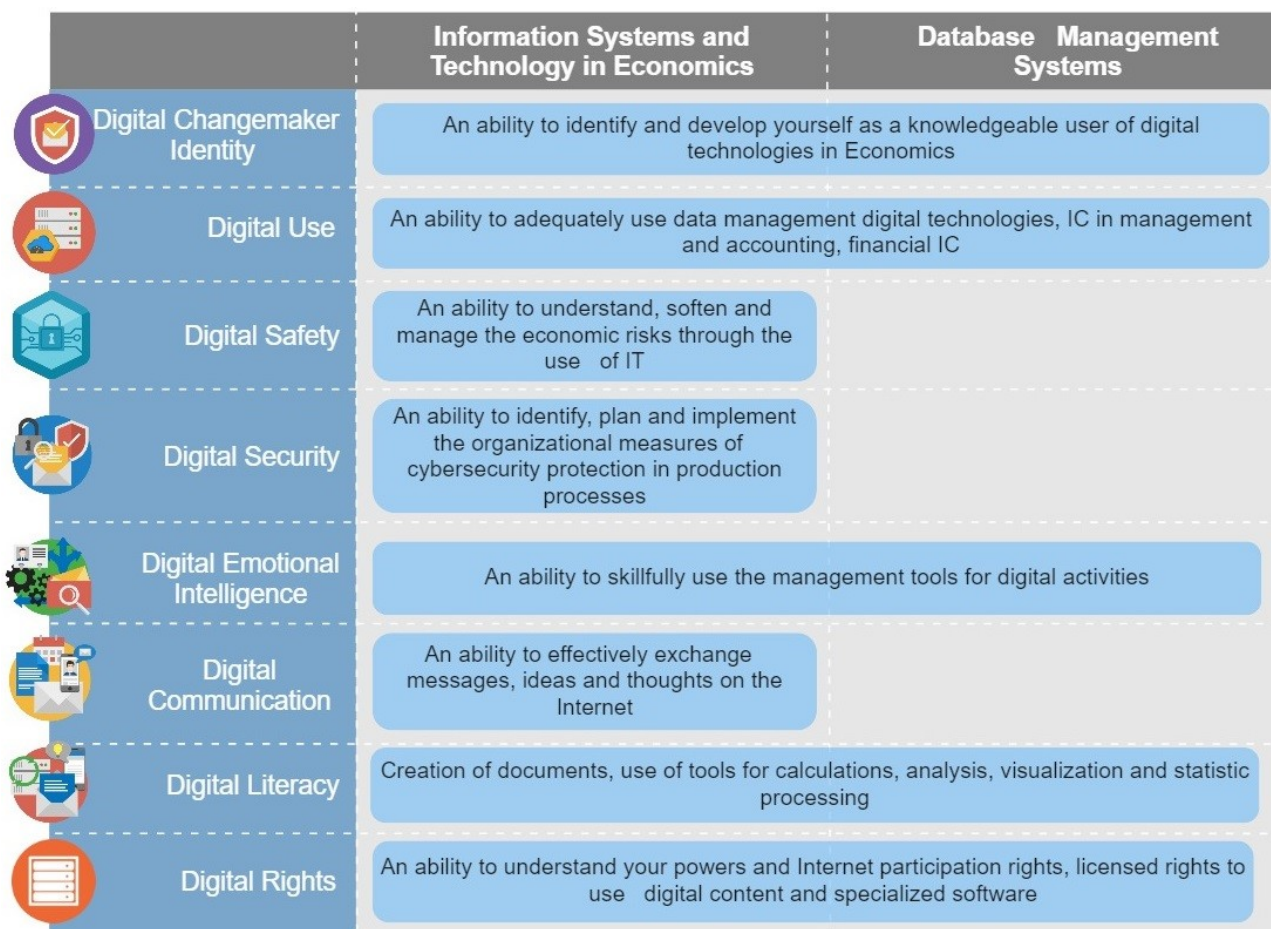
- “digital citizenship” is the use of digital technologies in everyday life, for interaction with each other, communication, viewing of digital content, etc.
- “digital creativity” is the use of digital technologies to create content, media, applications, etc.
- “digital entrepreneurship” is the use of digital technologies for business, professional activity, etc.

In our study, we define digital intelligence of future economists as a combination of theoretical knowledge, practical skills and abilities that allow to respond quickly to challenges and adapt to modern requirements of the digital society. Possessing such skills will enable future economists to adequately use digital tools for data retrieval and processing, apply management information systems,

manage economic risks, provide cybersecurity measures and establish mass digital communication in today's on-line space. The defined levels are applied to such components of digital intelligence as: Digital Changemaker Identity, Digital Use, Digital Safety, Digital Security, Digital Emotional Intelligence, Digital Communication, Digital Literacy, Digital Rights. In order to determine indicators for all components of the future economist's digital intelligence, it is necessary not only to analyze the DQ framework, but also the labor market requirements to the competences of a modern digital economist. The description of the components of digital intelligence is presented in figure 1. Thus, two basic academic disciplines – Information Technology in Economics and Database Management Systems, in the program of training of specialists in the economy are responsible for the formation of digital skills.

According to the data of DQ Institute, a person possesses Digital Changemaker Identity if he/she knows the general and emerging trends in the digital environment, identifies and evaluates innovative opportunities for business or social impact, provided by the improvement of new technologies, development of higher-order thinking skills, expansion of thinking beyond the individual scale to integrate digital networks and tools in response to broader social and economic challenges. Such people demonstrate professionalism and value, an interest in understanding the existing gaps in their digital competence and technology, using them for self-development and further business growth [13]. At the Future of Jobs Report forum, it was stated that the more work on soft skills in addition to hard skills, the more navigate easily tomorrow's job market [14]. Soft skills are crucial for the complex and dynamic process of career management and development for an economist mostly within the knowledge-based society context [15]. Teaching detailed and nuanced industry knowledge is arguably beyond the scope of entrepreneurship education systems, but to an extent, it is of paramount importance that students are exposed to the organic industry knowledge through interaction and experiential experiences. Within such interaction, the development of convergent 21st century skills such as social relationships, leadership, creativity and critical thinking further nurture entrepreneurial intents among students [16]. The indicator of the Digital Changemaker Identity is the ability to identify and develop yourself as a competent digital technology user in Economics. Within the framework of both academic disciplines, namely Information Systems and Technology in Economics and Database Management Systems the Digital Changemaker Identity skills can be developed through the use of project-based, case-based, and practice-oriented training.

Digital data technology, information systems in management, accounting and finance are increasingly playing a key role in managing business processes, including all areas of economic activity, and future economists therefore need Digital Use skills. In [17] several considerations and suggestions are drawn in terms of rethinking and pursuing usability in training when applied to Enterprise Resource Planning (ERP), and other business process management



**Figure 1.** Components of digital intelligence

software systems, SAP, which comes as an integrated solution that incorporates the key business functions and processes of an organization. The rapid growth through the use of Enterprise Resource Planning (ERP) systems by Indonesian companies has been responded by ERP vendors in providing skilled human resources in ERP environment by cooperating with universities, particularly for training accounting students. Satisfaction with class and instructor influence perceived ease of use, students feel satisfied with ERP training and this affects their intentions in using ERP in the future [18]. In article [19] presents the enterprise resource planning (ERP) course layout aiming at the current problems from six aspects of the curriculum, teaching content, teaching resource, teaching method, teaching evaluation, teacher training. M. Shraideh, C. Drieschner, B. Betzwieser, H. Kienegger, M. Utesch, H. Krcmar [20] planning and conduct a practical course for teaching topics of SAP Leonardo and SAP HANA by suggesting model for conducting a capstone course consisting of eight phases. The model is geared to teaching new and innovative industry-related topics by using a project-based learning approach including elements of experiential learning and role-play teaching. The formation and development of such skills is ensured in the course of studying Information Systems and Technology in Economics and Database management systems academic disciplines, as well as pro-

fessionally oriented disciplines in economics, accounting, analysis, modeling, management.

Organizations are faced with increasing complexity, uncertainty and enhanced threats from a wide range of forces. Depending on how this situation is handled, it can become risk or opportunity to erode or enhance business value. In addition, organizations have to meet most different stakeholders', legal and regulatory risk management requirements, comprehensive enterprise risk management are challenge and core competence for organizations' sustainable success [21]. Y. Raanan [22] research witch applications of risk management to many aspects of modern life, from insurance, banking, health issues, business ventures, to project management and more. The Digital Safety indicator is the ability to understand, mitigate and manage economic risks using IT.

Integration of digital security skills as an independent variable is critical to the understanding of the use of on-line protective measures. Having the necessary skills and knowledge to engage in a cyber-safety behavior can help users avoid cyber-victimization, reducing the odds of negative outcomes such as the theft of data, money or personal information [23]. Knowledge and skills in the areas of information security, information privacy, and copyright/intellectual property rights and protection are of key importance for organizational and individual success in an

evolving society and labor market in which information is a core resource [24]. The indicators Digital Security are the ability to recognize, plan and deploy organizational cybersecurity tools in manufacturing processes. The formation of students' Digital Security level is carried out in the process of mastering the content-rich Module "Digital Security: Protection in the Digital Environment" within the framework of Information Systems and Technology in Economics course.

It is widely acknowledged that emotional intelligence is a crucial component in organizations. It has been proved that leaders and employees who are emotionally intelligent are more efficient, creative, and make better decisions [25]. In today's digital and technical environment, employers are looking for personnel that can contribute to the organization not only with the use of technical skills but can also express their expertise with the use of positive emotional intelligence and communication effectiveness [26]. The indicator of Digital Emotional Intelligence is the possibility to skillfully use digital tools for management. The formation and development of such skills are ensured in the process of studying basic academic disciplines in information technologies – namely, Database Management Systems and Information Systems and Technology in Economics, as well as professionally oriented academic disciplines in management, project management and business modeling.

The importance of Digital Communication for economists is beyond question, as information and communication technologies are a driver of the digital economy [27]. Digital communication and collaboration use features of digital technologies with confidence for communication, cooperation and collaboration; effectively search, find, retrieve, process and communicate information from a variety of digital sources and in a variety of formats [28]. The ability for an undergraduate economist to apply analytical skills to economic issues of contemporary relevance is an integral part of their tertiary training. In order to encourage students M. O'Brien and K. Freund [29] explored the potential for future economist to exploit their social media communication skills with reflective blogging. The indicator of Digital Communication is an ability to effectively exchange messages, ideas and thoughts on the Internet. The formation of appropriate skills of Digital Communication in future economists can be carried out within Information Systems and Technology in Economics academic discipline while studying the informative module "Digital Communications in Global Space". Therefore, Digital Communication for the modern economist is both the ability to use the tools of gathering and disseminating professional economic information and data, assessable through digital means. This level partly overlaps with Entrepreneurial competence and is one of the main components of Digital Competence.

Information technologies are rapidly evolving and changing, along with that the term Digital Literacy is constantly acquiring new interpretations. This means that the role of information technologies in training specialists in different areas is undergoing constant change as well [30–32]. As stressed by M. Murray and J. Perez [33], many

students entering the university today have a high level of exposure to digital technologies and media. However, they are not prepared to cross the bridge between personal and academic use of technology. As academic know-how is gained through formal education, so too must technological prowess be gained through structured learning experiences. B. Chan, D. Churchill and T. Chiu [34] define digital literacy as "the ability to understand and use information in multiple formats with emphasis on critical thinking". The indicator of Digital Literacy of a future economist the creation of documents, use of tools for calculations, analysis, visualization and statistic processing. Economists may achieve such a level of Digital Literacy if they possess experience of using different technologies gained not only within the framework of studying such academic disciplines as Information Systems and Technology in Economics at the university, but also in the process of professional activity.

Organizations require skilled and knowledgeable professionals who understand risks and responsibilities related to the management of information privacy, information security, and copyright/intellectual property [24]. New digital networked technologies enable users to participate in the consumption, distribution, and creation of content in ways that are revolutionary for both culture and industry. Young people operate in the digital realm overwhelmingly ignorant of the rights, and to a lesser degree the restrictions, established in copyright law [35]. Software publishers use digital rights management, specifically copy-protection techniques, to prevent unauthorized and illegal copying of their software products [36]. The indicators of Digital Rights are the ability to understand your powers and Internet participation rights, licensed rights to use digital content and specialized software.

Competency indicators have been developed for each component of digital intelligence.

Indicators of digital intelligence skills at the level of "Digital Citizen":

DigCitizen1. **Digital Changemaker Identity** (using digital technologies to build your own image and the impact of knowledge and technology on professional development; using technologies to control and form your own digital identity; demonstrating honesty in technology use and self-efficacy by finding ways to take advantage of the opportunities available to you in the digital environment);

DigCitizen2. **Digital Use** (understanding of the impact of the use of digital technologies on health, productivity of work, welfare and lifestyle, the possession of the relevant knowledge to solve these consequences; the use of technology in a targeted manner to achieve better objectives, effective use of digital content and tools for their own benefit);

DigCitizen3. **Digital Safety** (understand the different types of behavioural cyber risks, how he/she can face these risks, how these risks can



affect him/her; develop the necessary technical, socio-cognitive, communicative and decision-making skills to deal with cyber risk situations when they occur; know the tools to overcome these negative outcomes on the Internet);

- DigCitizen4. **Digital Security** (ability to recognizing and eliminate technical and software cyber threats at the level of the operating system; work in the network, with personal data and copyrighted content; know the types of threats in the digital environment, identify strategies and tools to be used to avoid such threats; use digital technologies without compromising their data and devices);
- DigCitizen5. **Digital Emotional Intelligence** (possess social and emotional skills in digital interaction of people, connected with both psychological interaction and practical, physical actions in confirmation of socially determined socially significant things);
- DigCitizen6. **Digital Communication** (level to know and to be able to use various communication tools for effective messaging);
- DigCitizen7. **Digital Literacy** (ability to find, process, organize, visualize and store economic data);
- DigCitizen8. **Digital Rights** (understand the concept of confidentiality as a human right, what personal information is and how it can be used, stored, processed and shared on digital platforms along with strategies and tools that help keep personal information private and secure; is aware of copyright licenses and Creative Commons tools, licensing choices for licensors).

Indicators of digital intelligence skills at the level of “Digital Creator”:

- DigCreator1. **Digital Changemaker Identity** (future economist’s understanding of how to be aware of the progress of ICT; ability to integrate digital technologies in professional life; ability to explore and identify contemporary problems, jointly develop new ideas for their solution through technology);
- DigCreator2. **Digital Use** (ability to develop new ideas for solving the given tasks; to use self-motivation and ingenuity in using technologies in professional activity, for allocating available resources; select and use digital technologies and information systems to plan and execute business processes);
- DigCreator3. **Digital Safety** (understanding the cyber risks of content they face on the Internet; understanding the strategies associated with

appropriate behavior, and the skills needed to develop; using conflict management techniques to reduce cyber risks);

- DigCreator4. **Digital Security** (ability to plan and implement cybersecurity protection in the creation of digital content, organization of data security and working information systems; identify vulnerabilities, quantify associated risks (e.g., income deficiency or business losses); use tools, strategies and protocols to ensure and improve data privacy and security);
- DigCreator5. **Digital Emotional Intelligence** (identify, understand and use your own emotional states, to be able to direct them; promote cooperation and positive interaction between internal and external interested parties in order to achieve the set goal; understand and use your own emotional states, which are derivative and primary to digital media and personal value systems);
- DigCreator6. **Digital Communication** (create and transmit digital content, independently organize communication channels for communications (for a large number of users inclusive); store message histories, to resume task on the needed Internet page, the ability to use multiple communication tools without disrupting the workflow; ability to creating and organize videoconferencing);
- DigCreator7. **Digital Literacy** (ability to work with software environments for automation of processes of economic data processing (statistical, analytical); ability to create and use database management systems, data warehouses; ability to create and use economic and mathematical methods and models, diagnostic methods of control and estimation of the level of economic growth by means of automation using digital tools; ability to model and forecast economic processes using modern digital technologies);
- DigCreator8. **Digital Rights** (knowledge of the law and rights regarding the ownership of information and content hosted in a digital environment; ability to distinguish between creative use and appropriation of someone else’s work; ability to track and manage changes to your digital content to protect your/organizational assets from unauthorized changes or unauthorized use; ability to design and use patents, trademarks, copyrights to protect your digital works through a variety of tools and applicable legislation).

Indicators of digital intelligence skills at the level of “Digital Entrepreneur”:



- DigEntrepreneur1. **Digital Changemaker Identity** (ability to identify and evaluate innovative business or social impact opportunities that are enhanced by new technologies; ability to monitor and integrate emerging trends and technologies; ability to structure data collection to identify new technology products / services that determine the potential added value of the business for sustainability and profitability of the business);
- DigEntrepreneur2. **Digital Use** (use digital technologies to improve organizations, achieve business goals, work with economic indicators, information systems covering all spheres of economic activity, use systems to manage enterprise resources; create, implement and use information systems and technology in different spheres of economic activity);
- DigEntrepreneur3. **Digital Safety** (understand different types of cyber risks of commercial organizations, which can cause cessation or slowdown of business processes, loss of competitive advantage, loss of customers or profit, reduction of the business value and so forth; ability to identify risks and to develop creative strategies using digital tools to address and prevent the threats associated with those risks);
- DigEntrepreneur4. **Digital Security** (ability to organize a secure information environment for the business organization; ability to support cyber security in the organization, providing advice and guidance on potential risks and strategies for addressing them by developing and adhering to already developed communication strategies for organizations to ensure adoption and compliance of security policies and standards that ensure a viable environment for the enterprise);
- DigEntrepreneur5. **Digital Emotional Intelligence** (ability to develop interpersonal skills; ability to manage one's emotions, understand emotional responses and behaviors depending on the context and digital environment; ability to build partnerships at personal, local, social and global levels to achieve organizational goals);
- DigEntrepreneur6. **Digital Communication** (ability to create and establish different commu-

nication environments to discuss; ability to formulate business strategies and tactics in order to achieve the organization's goals);

DigEntrepreneur7. **Digital Literacy** (ability of a student to design databases, information systems, algorithms and data collection tools; develop decision-making models);

DigEntrepreneur8. **Digital Rights** (ability to effectively integrate legislation with one's own practice to ensure the support and enforcement of digital rights in the digital environment as part of the entrepreneurial activity).

### 3 Results and discussion

The pedagogical experiment on the development of digital intelligence competences for future economists lasted for 3 years and involved the first year students majoring in Economic (the total of 142 students). The formation and development of digital intelligence skills of future economists was carried out within the framework of studying the Information Systems and Technology in Economics academic discipline. The formation of DQ was carried out in 3 stages: (1) Digital Citizenship through two content modules in the Information Systems and Technology course; (2) Digital Creativity through a competency-based project; (3) Digital Entrepreneurship through practical training using real-life work situations. The course of experimental research included measuring students' digital intelligence skills before the start of the discipline and at the end of each stage.

The course content modules on Information Systems and Technology in Economics included: Digital Identity and Rights of the Modern Economist, Digital Security: Protection in the Digital Environment, Cyber Risks in the Public Digital Domain, Digital Communications in the Information Environment, Economic Data Tools, Visualisation of Economic Information, Digital Tools for Economist Management, Information Systems for Economic Activity. The process of forming appropriate skills in accordance with the components of digital intelligence level "Digital Citizen" was provided by a set of educational resources and services, tasks for laboratory work.

After completing the two modules of the discipline, students were offered a project assignment to achieve the Digital Creativity level. During the project work, students learned how to apply a set of services and tools developed during theoretical training to solve different types of tasks related to economic activity of an enterprise. Before starting the tasks of this project, the students had to split into small groups, plan the teamwork, choose a service to manage the project, assign roles to the participants, set areas of responsibility and deadlines for the tasks. In the course of the project assignment, the students were asked to develop the information structure of the virtual business activity based on the analysed organisational and functional

structure of the enterprise; to select the software for economic activity (processing, systematisation, visualisation and storage of economic data), tools for confidentiality and data security using appropriate cloud services.

In order to achieve the “Digital Entrepreneurship” level of the learning experience, the students were asked to solve a case study based on the production situation described. An example of such a task is given below. “A retail chain is planning to expand its branches. Given the number of employees, customers and counterparties of the company planned after the expansion, to analyse the technical and functional characteristics of the existing systems in the market and to select the optimal in terms of purchase and maintenance costs: CRM-system; tool for checking the activities of counterparties; tool for assessing the financial performance of the company. Evaluate the cost of implementing such systems in the company. Set up user authorisation rules in the selected systems to ensure the security of company data”. The result of the completed task is a presentation of the completed work in the form of a joint document, which is generated by all participants of the project.

The leading idea of the research concept is reflected in the hypothesis based on the assumption: if the training of modern economists is carried out according to the proposed phased formation of digital intelligence skills, it will increase the levels of digital intelligence: “Digital Citizen”, “Digital Entrepreneur” and “Digital Creator”.

At the beginning of the pedagogical experiment, each student assessed their own level of competence in the components of digital intelligence in accordance with the developed indicators on a scale from 0 to 10 for the levels of “Digital Citizen”, “Digital Creator”, “Digital Entrepreneur”. For each level, the average value of the formation of the corresponding component of digital intelligence was determined. After completing the training, in which students were offered resources, tasks, training practices for the formation of digital intelligence skills at different levels during three stages, students were asked to re-evaluate the level of formation of digital intelligence competencies. The results of the experiment for 3 academic years on the formation of competencies in digital intelligence at the levels of “Digital Citizen”, “Digital Creator”, “Digital Entrepreneur” are presented in Table 1-3.

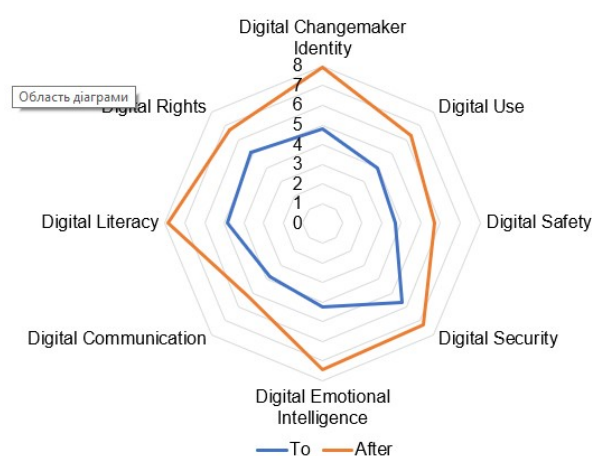
To confirm the hypothesis of the study, a null hypothesis was put forward: the average value of the level of formation of digital intelligence before and after the experiment for each level does not differ. Deviation of this hypothesis for each level will confirm the effectiveness of the technologies used. The sample data have a normal distribution and form a pair of correlating values, whereas the paired Student t-test was chosen to evaluate the results.

Assessment of digital intelligence skills at the level of “Digital Citizen” is presented in table 1.

The sample data have a normal distribution and form a pair of correlating values, whereas the paired Student t-test was chosen to evaluate the results. The t-criterion was calculated by the formula  $t = \frac{|M_d|}{\frac{s_d}{\sqrt{N}}}$ , where  $M_d$  – is the mean difference of the values,  $s_d$  – standard deviation,  $N$  – the

**Table 1.** Assessment of digital intelligence skills at the level of “Digital Citizen”

Components of digital intelligence	Sampling		Deviation from the average	
	To	After	To	After
DigCitizen1	4.78	7.94	0.26	1.14
DigCitizen2	3.95	6.33	-0.57	-0.47
DigCitizen3	3.70	5.67	-0.82	-1.13
DigCitizen4	5.69	7.27	1.17	0.47
DigCitizen5	4.26	7.41	-0.26	0.61
DigCitizen6	3.81	5.27	-0.71	-1.53
DigCitizen7	4.86	7.84	0.34	1.04
DigCitizen8	5.13	6.67	0.61	-0.13
$\Sigma$	36.18	54.40	0.02	0.00
Average value	4.52	6.80		



**Figure 2.** Graphical interpretation of digital intelligence skills at the level of “Digital Citizen”

number of parameters. The estimated t-criterion is 8.7, the critical value of the Student’s t-criterion for the number of degrees of freedom 7 is 2.365. Since  $t_{estimated} > t_{critical}$ , we can reject the null hypothesis and conclude that the difference in average values before and after the experiment is statistically significant ( $p=0.05$ ).

As can be seen from table 1, students have increased the level of skills “Digital Citizen” as a result of studying the proposed courses by an average on 22.8%. Graphical interpretation of the results of the experiment for the level of “Digital Citizen” are given in figure 2.

Assessment of digital intelligence skills at the level of “Digital Creator” is presented in table 2.

The estimated t-criterion is 2.534 and exceeds the  $t_{critical}$ , we can reject the null hypothesis and conclude that the difference in average values before and after the experiment is statistically significant ( $p=0.05$ ).

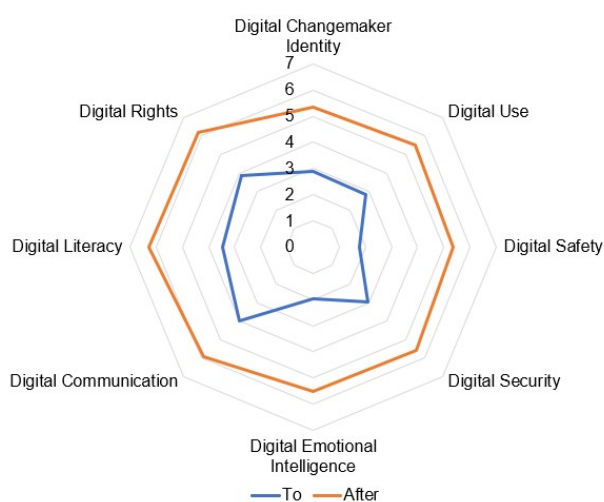
As can be seen from table 2, students increased the level of skills of “Digital Creator” as a result of project tasks by an average of 27.3%. Graphical interpretation of the results of the experiment for the level of “Digital Creator” are given in figure 3.

**Table 2.** Assessment of digital intelligence skills at the level of “Digital Creator”

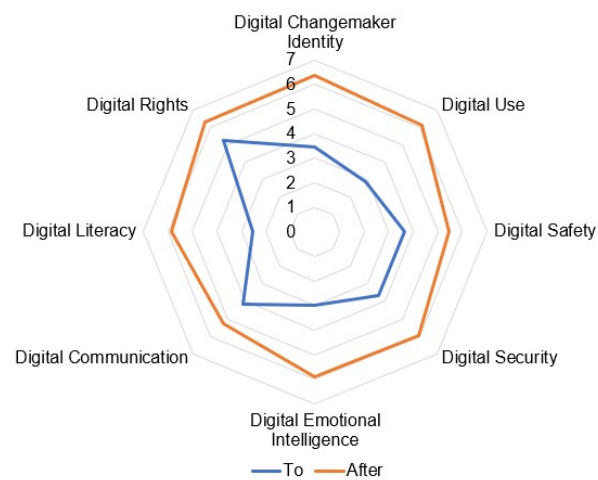
Components of digital intelligence	Sampling		Deviation from the average	
	To	After	To	After
DigCreator1	2.91	5.35	-0.07	-0.36
DigCreator2	2.85	5.53	-0.13	-0.18
DigCreator3	1.78	5.33	-1.20	-0.38
DigCreator4	2.98	5.58	0.00	-0.13
DigCreator5	1.97	5.50	-1.01	-0.21
DigCreator6	3.98	5.92	1.00	0.21
DigCreator7	3.47	6.29	0.49	0.58
DigCreator8	3.86	6.18	0.88	0.47
Σ	23.80	45.68	-0.04	0.00
Average value	2.98	5.71		

**Table 3.** Assessment of digital intelligence skills at the level of “Digital Entrepreneur”

Components of digital intelligence	Sampling		Deviation from the average	
	To	After	To	After
DigEntrepreneur1	3.44	6.37	-0.13	0.46
DigEntrepreneur2	2.88	6.16	-0.69	0.25
DigEntrepreneur3	3.65	5.45	0.08	-0.46
DigEntrepreneur4	3.64	5.96	0.07	0.05
DigEntrepreneur5	2.98	5.91	-0.59	0.00
DigEntrepreneur6	4.16	5.30	0.59	-0.61
DigEntrepreneur7	2.55	5.85	-1.02	-0.06
DigEntrepreneur8	5.26	6.31	1.69	0.40
Σ	28.56	47.31	0.00	0.03
Average value	3,57	5,91		



**Figure 3.** Graphical interpretation of digital intelligence skills at the level of “Digital Creator”



**Figure 4.** Graphical interpretation of the results for the level of “Digital Entrepreneur”

Assessment of digital intelligence skills at the level of “Digital Entrepreneur” is presented in table 3.

The estimated t-criterion is 7.22 and exceeds the  $t_{critical}$ , we can reject the null hypothesis and conclude that the difference in average values before and after the experiment is statistically significant ( $p=0.05$ ).

As can be seen from table 3, students have increased the level of skills “Digital Entrepreneur” as a result of internships by an average of 23.6%. Graphical interpretation of the results of the experiment for the level of “Digital Entrepreneur” are given in figure 4.

In the results of the experiment in the first, second and third stages, presented in figures 2-4, and in tables 1-3, we observe the heterogeneity of the indicators of the formation of digital intelligence skills for different components. After the first stage, the highest level is observed for the components of digital identity, security, emotional intelligence, and digital literacy, which we explain by additional thematic MOOCs and by the using of appropriately selected resources and services for training skills, matched the specified digital intelligence components. For the development of other digital intelligence components for the

level of Citizen, other professionally-oriented courses are provided, during which these skills will be developed, for example, the discipline “DBMS”. For the levels Creator and Entrepreneur levels, the level of skills formation with different elements is connatural, which is explained by the formation of competency and practice-oriented tasks considering the development of all components of digital intelligence, applying blended learning technology, which included project work methods, case method, individual and teamwork. Achieving the maximum values of the corresponding indicators of the digital intelligence is expected during the study of other professionally-oriented disciplines.

## 4 Conclusions

The analytical study made it possible to identify and describe the following components of the digital intelligence of the economist: Digital Changemaker Identity, Digital Use, Digital Safety, Digital Security, Digital Emotional Intelligence, Digital Communication, Digital Literacy, Digital Rights. The content of the Information Systems and Technologies academic discipline for training

future economists at universities, in which digital intelligence skills can be developed, is proposed.

The developed approach gives the possibility to formulate digital intelligence skills of the Digital Citizen, Digital Creator and Digital Entrepreneur levels. The essence of the approach lies in the step-by-step formation of skills that correspond to each successive level. The initial stage involves studying the educational material and performing a series of hands-on classes within the disciplines. In this way, Digital Citizen skills can be formed. The second stage is to carry out a project work that requires creativity to solve the project task, and as a result, future economists will develop the skills of the Digital Creator level. The third stage involves the fulfillment of a real production situation, which requires the student not only to have previously acquired knowledge, skills and their application in practice, but also to gain new experience in solving typical production situations and responding to appropriate challenges. This stage is designed to build students' Digital Entrepreneur skills.

Three-stage approach of forming skills of digital intelligence was tested for three years to train students in "Economics". As a result of pedagogical experiment, the level of digital intelligence skills has been increased, in particular, the level of "Digital Citizen" increases by 22.8%, the level of "Digital Creator" by 27.3% and the level of "Digital Entrepreneur" by 23.6%. The obtained results show that under the given conditions of the organization of training during studying of educational course Information Systems and Technology in Economics at students of economic specialties the level of digital intelligence increases on the average by 24.4%. But the development of digital intelligence of future economists is carried out in the future during the study of vocational courses, internships, diploma design, as well as through non-formal education.

Among the perspective areas of research, we see the definition of conditions and construction of models of individual educational trajectory for students of economic specialties in order to effectively develop their digital intelligence.

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## Self-education and self-management to develop entrepreneurship competence in future professionals

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**Abstract.** The relevance of this article lies in the need to improve the process of developing competences future professionals need to develop self-employment skills under the conditions of the socio-economic crisis and the instability of the Ukrainian labour market. The article aims to prove the need for systematic implementation of self-education and self-management technologies in Ukrainian professional education schools to develop entrepreneurship competence in future professionals. Research methods include a survey and an analysis of documentary information. Ukraine strives to increase the importance of young people's readiness for lifelong learning. However, the article finds that most students do not have sufficient psychological knowledge and self-management skills for successful self-development and self-employment. The development of entrepreneurship competence is, for the first time, justified through the systemic implementation of self-education and self-management technologies in the educational process of professional education schools. The article presents a pedagogical technology for developing entrepreneurship competence in future professionals through self-management. Besides, it offers the most effective forms of its introduction (psychology workshops, video lectures, electronic portfolios) and singles out the optimal conditions of their use. The level of the technology's readiness is IRL5 (the efficiency was proven at the level of experimental educational institutions). Success in its implementation depends on the regulatory recognition of the role of the social and humanities-related component in professional education; the incorporation of a self-management course in all programmes for training, retraining and advanced training of psychology and teaching staff; the encouragement of teaching staff to effectively use the described technologies in the educational process; systematic training of students to implement self-education and self-management as the technologies of success.

### 1 Introduction

The experience of the advanced countries shows that entrepreneurship today is the most innovative system of economic management regardless of the socio-economic structure of society. The proceedings of the World Economic Forum, analytical reports of the USAID Leadership in Economic Governance Program, UNDP Programme and other statistical materials highlight the importance of entrepreneurship for the world and national economies. The features of modern entrepreneurship include the optimization of the profitability potential, the use of creative approaches to business organization, the search for new resources, innovation, optionality, innovation and social responsibility.

The development of entrepreneurial activity is one of the main prerequisites for developing and realizing the state's potential since entrepreneurs form a significant part of the tax revenues of the state and local budgets. Given the socio-economic crisis and instability of the labour mar-

ket today, entrepreneurship may be the beginning of a business career for young professionals and an opportunity for creativity, professional self-realization and success. Entrepreneurial activity of today's youth should provide the appropriate economic and social effect. The latter should lie in improving living standards, reducing unemployment rates and creating new jobs. Moreover, it should contribute to building the middle class, which will serve as the basis of socio-economic reforms and the guarantor of political and social stability of a democratic society.

The United Nations has identified three global goals for education to contribute to the issue under consideration. They are as follows: to improve employment through involvement in entrepreneurship and, thus, contribute to sustainable economic development; to strengthen social integration; to involve future professionals in community activities; to provide access to lifelong learning.

On January 17, 2018, the European Parliament and the Council of the European Union approved the Revised Key Competences for Lifelong Learning Framework. It defines entrepreneurship competence as a key competence that will promote financial literacy, social integration, active citizenship, equality and democracy [1].

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The global pandemic has also become a challenge for all spheres of human life [2–5]. It has highlighted the issue of adjusting professional training to the needs of the post-pandemic labour market. The paradigm shift of economic and social relations, as a result of the long quarantine, has motivated students to acquire those competences that will promote professional mobility, self-development, self-improvement and self-employment [6].

Entrepreneurship competence will become a tool for solving many important economic and social issues. They mostly involve providing the national market with various goods, reducing unemployment rates, building the middle class, enhancing competition, cultivating economic culture and many others.

Many documents address the need to develop entrepreneurship competence in future specialists. These documents include the Copenhagen Declaration, the Bruges Communiqué, the Laws of Ukraine “On Vocational Education”, “On Education”, “On Development and State Support of Small and Medium-Sized Businesses in Ukraine”, the National Doctrine of Education Development in Ukraine in the 21st Century, the Strategy for Small and Medium-Sized Enterprise Development in Ukraine until 2020, the National Strategy for Education Development in Ukraine for 2012–2021, the National Programme for Small Business Development in Ukraine, the Government’s Medium-Term Priority Action Plan for the period up to 2020, the Concept of the New Ukrainian School.

In the context of this research, noteworthy are foreign studies in which the efficiency of entrepreneurship is inextricably linked with the quality of human capital [7–9], the main attention is focused on the importance of developing creativity in future entrepreneurs [10], heuristics and activity [7, 11], as well as personal qualities one needs for self-development [11–13]. Researchers highlight the relevance of developing the cognitive component of entrepreneurship competence [14], psychological, economic and legal readiness for entrepreneurship [15–17], digital competence [18–30], as well as using crowd technologies [18] and boosting motivation towards self-improvement [20]. It is important to note that only Ukrainian researchers focus on the economic and legal aspects of preparing young people for entrepreneurship. World class researches usually presents the issues of self-education and self-management through proving the effectiveness of investment in human capital for business success.

In 2019, the employees of the professional career laboratory at the Institute of VET of the NAES of Ukraine conducted a survey [31] to study the readiness of future skilled workers for entrepreneurship. The survey involved 658 respondents, namely, students from Higher Vocational School No 11 (Khmelnitskyi), Vinnytsia Vocational Education Centre for Processing Industry (Vinnytsia), Lviv Higher Vocational Arts School (Lviv), Odesa Higher Vocational School of Trade and Food Technology (Odesa), Regional Vocational Education Centre for Garment Production and Service Sector of Kharkiv Oblast (Kharkiv), Cherkasy Professional Road-Transport Lyceum (Cherkasy). The analysis of documentary information helped to study relevant scientific sources on the issues of

developing entrepreneurship competence, self-education and self-management.

The article aims to prove the need for systematic introduction of self-education and self-management technologies in professional (vocational) education (P(V)E) schools based on the analysis of relevant scientific sources and results from students’ assessment of their readiness for entrepreneurial activity.

## 2 Results and discussion

According to the EU Framework Programme, entrepreneurship is the ability to respond to opportunities, ideas and turn them into values [1]. Entrepreneurship is considered as an independent, systematic production of goods, performance of works, provision of services by individuals and legal entities registered as business entities to receive income in the manner prescribed by law (Art 1 of the Law of Ukraine “On Entrepreneurship”) [32]. Entrepreneurship as the most flexible form of production organization responds quickly to market needs, as well as to the latest advances in scientific progress. Also, it promotes timely structural changes in the economy. The development of entrepreneurs means the development of young carriers of innovative ideas and projects, authors of extraordinary techniques and technologies, inventors of new ways and means of social development.

Entrepreneurship competence implies certain knowledge, skills and attitudes towards the use of entrepreneurial approaches to solving social problems and introducing innovations. The basic knowledge, skills, abilities and qualities related to entrepreneurship competence include [1]:

- a) knowledge about ways of turning ideas into personal, social and professional activities, approaches to project planning and management, understanding of economic and social opportunities and ethical principles,
- b) such skills as creativity, strategic thinking, critical analysis of creative processes and innovations, independent financial decision-making regarding price and value, effective communication and negotiation, emotion management, reasonable decision-making,
- c) qualities characterizing entrepreneurship (initiative, activity, curiosity, courage and perseverance in achieving goals, desire to motivate others and value their ideas, empathize and care about people and the world, take responsibility for the ethics of actions throughout the process).

The strategic goal of modern education is to create a highly educated, intellectual, self-sufficient and creative person with an innovative type of thinking and activity who can respond to today’s challenges adequately. The existing socio-economic conditions and competition in the labour market require future professionals to understand the basics of entrepreneurship. This issue is especially relevant under globalization of economic processes, given the increasing socio-economic importance of entrepreneurship.

The results of the survey show that modern young people actively perceive entrepreneurial values and attitudes. Indeed, the vast majority of respondents are at a high level of professional motivation and are ready to take responsibility for their professional future. Besides, 541 students (82.22%) express their readiness to develop themselves in the chosen field and build a professional career. At the same time, only 19.15% of respondents indicate that they plan to start their own business in the chosen field; 6.53% of them are ready to work as entrepreneurs in another field [14]. The conducted surveys show the need to enhance the theoretical and practical training of students for entrepreneurship. First of all, it should motivate them to be able to run their own business. Next, such training should provide a holistic vision of the essence and content of business activities, promote the development of entrepreneurial thinking and develop the ability to implement the acquired knowledge in practice.

Still, the analysis of educational practice shows certain issues hindering these processes. Despite some positive changes, reinforcement and promotion of entrepreneurship in Ukraine, there are insufficient conditions for preparing young people for entrepreneurship. Educational institutions employ outdated approaches to learning and do not take into account modern trends in innovative and social entrepreneurship. One can solve these issues by developing and implementing innovative measures in educational activities. They will be able to maximize the reserve capacity of consciousness, psyche, thinking and help to involve young people in entrepreneurship within the educational process. It mainly concerns the active use of online learning resources and self-management technologies.

Today, there are many online learning resources, which prepare for entrepreneurship. The use of Internet resources contributes to flexibility, accessibility, expansion and modernization of training future professionals for entrepreneurship. It helps to specify methods and tools, facilitate independent activities and individualize the educational process, taking into account the needs of young people. Such online resources include courses for creating startups and opening one's social and innovative business.

The well-known online learning resource is the Prometheus platform [33], which offers an online course, titled "Entrepreneurship. One's Business in Ukraine". It offers video lectures on preparation for entrepreneurship and covers the success stories of young entrepreneurs, analyzes their mistakes and provides recommendations. In particular, the platform shows the experience of such startups as Nataliia Misnyk (Be My Guest Bakery), Andrii Peliukhovskiy (Smart Coffee), Yaroslav Kaplan (Escape Quest), Lydiia Suiarko (UA Krasa), Oksant Tymkiv (ABC Club Children's Development Centres), Yuliia Savostina (Made in Ukraine Festival). As noted by the developers, this course provides not only knowledge but also strength and inspiration to take responsibility, show initiative and change reality. The Prometheus offers a series of courses based on innovative techniques. The course, titled "Introduction to the Theory of Constraints" reveals the methodology of company management, which differs significantly from the existing one. This course helps par-

ticipants to understand the theory of constraints and traditional methods of company management. It pays particular attention to pragmatic tools of constraint theory, in particular thought processes.

Modern online forms for preparing young people for entrepreneurship include educational series, in particular the educational series "Start a Startup" available on the Ukrainian platform "Diia. Tsyfrova Osvita" (Action. Digital Education) [34]. It covers the key issues in creating startups.

It is also essential to use the National Platform for Small and Medium-Sized Business as educational content in the preparation of future professionals for entrepreneurship [35]. It contains materials for self-education, in particular, "A Useful Textbook on Creative Entrepreneurship" [36]. This resource presents methods for developing, testing and transforming creative ideas into a real business, which will help one to plan, build and develop a new creative business. Besides, it offers the PRO platform for effective regulation [37], which includes step-by-step instructions for starting a business and interacting with the authorities.

Only a person who has learned how to manage and understand oneself can start one's own business and manage others. Therefore, it is of paramount importance to teach one to know oneself. However, it is almost impossible to manage oneself, one's time, life and activity, engage in self-development and self-improvement without self-management [38].

Personal management implies developing clear algorithms for time-management and self-development to achieve personal and professional success based on rational selection of appropriate methods, techniques and forms of teaching influence. Thus, the goal of self-management technologies is to teach future professionals to achieve personal and professional success. The main objectives of these technologies are the following: to optimize time expenditure; to use intellectual, physical and emotional resources rationally; to increase productivity. The main areas of self-management are time management, personal management, life management.

Time management is a set of methods and techniques for flexible organization of time to perform current tasks and projects. Nowadays, time management is most often called "a technology" since it offers clear algorithms for achieving well-defined results (streamlining work → saving time → increasing productivity → quality and timely results). Typical approaches to time management involve setting priorities, breaking down large tasks and projects into individual actions and delegating individual tasks to others. Time management also includes methods of influencing motivation and monitoring results. The main support tools of time management are a personal calendar, a list of current tasks and a list of projects. Time management mechanisms (calendar and to-do list, their categorization and prioritization) are also implemented in various softwares (Microsoft Outlook, iCal) and smartphones, PDAs. Psychological training sessions are more and more focused on the issues of time management and its techniques. The most popular time management tech-



niques are “The Eisenhower Matrix”, “The Pomodoro Technique”, “The Pareto Principle”, “The ABC Analysis”, “The Eat the Frog Technique” and others.

Personal management is a way of managing one’s personality and career development and achieving certain goals, as well as an individual technology of effective use of personal time-space. The simplest model of personal management [39] includes several of the most important interrelated functions. They involve setting, analyzing and creating personal goals; planning and elaborating alternatives; making decisions; realizing and organizing self-development, compiling to-do lists, organizing one’s work; enabling information and communication; correcting goals; self-motivation and self-control. The model also helps one to develop some important personal qualities. They include the following: self-knowledge (ability to determine one’s inclinations, weaknesses and strengths, creativity, characteristics of perception, temperament, character, emotional and volitional sphere, communication); ability to formulate one’s life goals and values (knowledge about moral and ethical principles; readiness to build a hierarchy of personal, career, civic and other values and define personal and career goals); decision-making (ability to set priorities, make optimal choices, act rationally, avoid overload); self-organization (ability to organize personal time-space rationally, use one’s internal resources effectively and take care of mental and physical health); self-discipline (self-control, self-regulation, integrity, punctuality); career planning (ability to make career plans and determine professional tasks and deadlines); self-improvement (ability to create a strategy for personal development, use self-cultivation techniques and technologies, develop the skills needed to achieve personal and professional success).

Life management is the way one lives one’s life. In ancient times, a person was seen as an adjunct to large social groups (the state, nation, class, social class) which determined and exercised external control over the lives of each of its members. The power of the group was exercised regardless of the desires and aspirations of people. Besides, it was consolidated by the power of tradition, custom, law and morality of the time. In modern democratic society, a person is the leader and organizer of his or her life. Democracy condemns external management of human destiny, creating conditions for comprehensive development of human talents and abilities and effective self-realization in the family, profession, society. The concept of life management, voluntary and conscious management of one’s destiny, has become the embodiment of independence and responsibility for one’s life.

Nowadays, different scientific sources often identify the concepts of personal management and life management as the same ones. However, there are serious differences between them. Indeed, life management is strategic management, while personal management, time management and other areas of self-regulation act as tools which contribute to effective implementation of strategic life plans.

It is essential to teach future professionals to build the right strategic scheme of personal and career development;

to familiarize them with the mechanisms of rapid response to socio-economic, political and cultural transformations; to develop their memory, thinking, creative skills and sociability; to strengthen their volition; to motivate them to manage their psycho-emotional states, generalize and integrate life experience. All this is possible only through self-observation, self-analysis, self-control, self-regulation and self-improvement. A person’s life success directly depends on the level of these qualities.

Importantly, the results of the survey on P(V)E schools students’ readiness to run an independent business show that 82% of them consider themselves ready for it. However, the vast majority of respondents in each educational institution acknowledge the lack of necessary resources, knowledge and experience. More than 20% of the surveyed students feel the lack of psychological knowledge about personal skills they need to open and run a business. At the same time, 52% of them are either completely unfamiliar with psychological traits and qualities necessary for entrepreneurship or have never done any psychological tests and do not know how they are expressed in them. Almost 16% of respondents admit that they do not have self-presentation skills; 27% of them believe that they do not know how to present their business idea; 15% of them do not know how to use popular social networks for self-presentation, labour market analysis and promotion of their business ideas.

Thus, P(V)E schools need to familiarize future professionals with the basics of self-management and provide them with the necessary psychological knowledge for successful entrepreneurship. In this regard, one should introduce a pedagogical technology for developing entrepreneurship competence in future professionals using some elements of self-management. It is a system of step-by-step pedagogical actions regarding training, education and development focused on self-management forms, methods and techniques to cultivate the qualities, abilities and skills one needs to open a successful business. The main result of this technology lies in a set of personal qualities which underlie the main components of entrepreneurship competence. They include self-awareness, personal values, self-motivation, self-knowledge, labour market, entrepreneurial activity, level of aspirations and self-esteem, self-improvement, self-actualization and self-presentation. However, one needs to use psychology workshops, video lectures and electronic portfolios to implement this technology.

A psychology workshop is a set of both offline and online diagnostic and counselling procedures conducted by psychologists, social educators, class supervisors, invited professionals under the approved programme on psychological diagnostics and counselling at the career centre of the educational institution (if any). These procedures aim to inform students about the traits they need to develop professional competence, teach them to determine peculiarities of their temperament, character, emotions, communication and make a self-portrait. Besides, they help students to identify traits and qualities favourable and unfavourable for developing entrepreneurship competence and build a strategy for personal development and profes-

sional career. To do this, psychologists, social educators or class supervisors select the techniques necessary for psychological diagnostics of students. Before each test, they should acquaint students with some psychological phenomenon that they will explore later. Tests can be done individually online or in small groups in optional lessons or during group consultations, homeroom hours in compliance with the necessary conditions for this type of work. After completing tests, each student needs to determine his or her development level of the phenomenon under study and record the results in a special copybook (if technically possible, one can create an interactive online copybook). The findings of the tests included in the testing programme serve as the basis for making a self-portrait, which should reveal the traits and qualities favourable and unfavourable for running one's own business. Next, students need to create a strategy of self-realization [17], in which they determine the trajectory of their professional career and the stages of their business development.

A video lecture is organized screening and discussion of documentaries and feature films on entrepreneurship. It is a very effective form of developing personal traits important for starting and running a business. It acquaints students with real and invented images of successful entrepreneurs, analyzes specific situations of success, struggle for one's ideals and values and shows ways to overcome difficulties and be socially responsible. Showing the stories of real successful business projects, video lectures stimulate students' interest in entrepreneurship. Besides, they are convenient to work in the classroom, during extracurricular activities or remotely. They can be used during the holidays, without distracting students from classroom activities and preparation for them. Importantly, teachers should prepare a list of questions students need to answer after watching each film to increase the pedagogical effectiveness of video lectures. After watching, teachers and students can discuss such films during homeroom hours, in lessons of certain subjects, on social networks or through Microsoft Teams, Zoom, Skype. The best forms for discussion involve writing essays.

An electronic portfolio is an electronic resource for storing and disseminating information about the achievements of future professionals of a particular educational institution. It aims to record and accumulate their achievements, professional growth and results during their studies at the educational institution. This is a very promising way to develop such important business qualities as self-motivation, self-esteem, self-improvement, self-actualization and self-presentation. When working on the content of the electronic portfolio, students develop self-assessment, self-motivation, self-development and self-improvement skills. Electronic portfolios contain information about students' abilities, values, plans, achievements, honours and awards in the main areas of their lives. These are as follows: personal ("the self-personality" – the most promising personality traits and qualities important for personal and professional success and social recognition); family-related ("the self-family" – the most important family and family values, traditions, plans); social ("the self-citizen" – socially responsible skills, civic

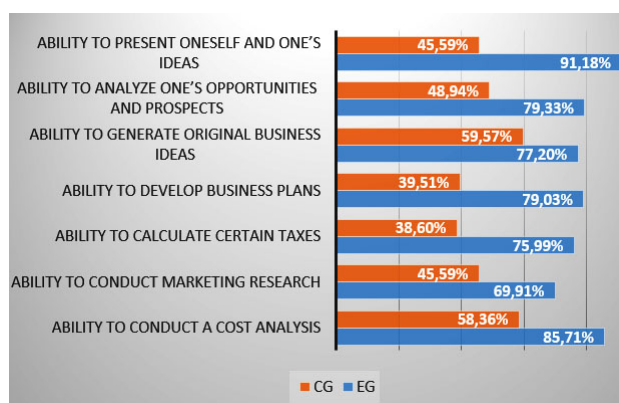
competences, volunteering experience); professional ("the self-professional" – professional goals and values, examples of professional activity, workshops, skill presentations). Electronic portfolios can be created on the website of the educational institution as separate personal pages. The information they contain may include hyperlinks to many documents stored in cloud services or on the pages of other websites. Thus, information about the student's progress becomes available to the general public and may be of interest to potential employers while still in school. At the same time, such portfolios have a fairly wide range of practical implementation depending on technical facilities in the educational institution and teachers' and students' ICT competences.

Using the described forms of work to develop entrepreneurship competence in future professionals opens special opportunities for establishing strong interdisciplinary links. In particular, the process of making a psychological self-portrait can combine the efforts and experience of psychologists, social workers, class supervisors and subject (history, language and literature) teachers. Class supervisors or social educators organize testing; psychologists conduct individual consultations on its results; language teachers help students to make a psychological self-portrait as a discursive essay on their traits, qualities and development prospects. Also, such portfolios contribute to developing digital skills [19, 20, 40] and unite computer science teachers (administering the educational institution's website, creating a local network of private portfolios, teaching students to upload content to their pages, preparing presentations, editing movies), psychologists and class supervisors (teaching students to create an archive of their successes and achievements, defining tasks for self-development and self-improvement, developing self-presentation skills), vocational masters, methodologists and educators (teaching to systematically record and effectively present the results of students' professional activities during industrial practice).

Thus, it is possible to organize thought-provoking and effective work in the educational institution to prepare students for entrepreneurship using the self-management technology, even during the quarantine, as long as teachers are well-trained, motivated and eager to work together.

A certain system has been developed to assess students' initial knowledge, skills and learning outcomes to develop entrepreneurship competence in future professionals in P(V)E schools. It covers the diversity of entrepreneurship competence, criteria and indicators for assessing it. In the first year of the experiment, the introduction of this system in the experimental institutions has shown significant changes in students ability to conduct a cost analysis and marketing research, calculate certain taxes, develop business plans, present and defend entrepreneurial ideas.

The authors of the article have used the materials of the experiment conducted by the professional career laboratory at the Institute of VET of the NAES of Ukraine on the development of entrepreneurship competence in students from P(V)E schools to prove the effectiveness of the above mentioned technologies. The experimental (EG) and con-



**Figure 1.** The dynamics of entrepreneurship competence development

control (CG) groups, having 329 respondents each, were identified as part of the experiment. It is important to note that CGs followed traditional methods, while EGs used the above-mentioned technologies (self-education with the use of online learning resources and self-management) (see figure 1).

Students were offered to match certain concepts and definitions and solve certain problems. It was necessary to check their understanding of the main economic categories, entrepreneurial management mechanisms, provide them with the necessary psychological knowledge and develop their self-management skills. The assessment of students' knowledge and skills has made it possible to determine the dynamics of positive changes in the development of entrepreneurship competence (cognitive and personality-reflexive components).

Thus, the obtained results allow one to recognize the proposed measures as effective.

### 3 Conclusions

This article considers the development of entrepreneurship competence, as its initial category, in two aspects. They involve the contexts of self-education (independent acquisition of knowledge, skills and abilities necessary for successful entrepreneurship) and self-management (willingness for self-realization, self-development and self-affirmation through entrepreneurial initiative). The analysis of relevant scientific sources and collected empirical data proves that the development of entrepreneurship competence should be based on one's readiness for life-long learning. The article shows that the informational and psychological components of self-education should become the active use of online learning resources and self-management technologies. Today, they are the most effective way to develop a system of knowledge, skills, views, beliefs and qualities one needs to open a successful social or innovative business.

The importance of one's psychological readiness to run a business and ability to use emotional, physical, intellectual, time and material resources rationally is obvious. Yet, the authors of the article have experimentally proved

that most students do not have sufficient psychological knowledge or self-management skills. Besides, they have introduced the pedagogical technology for developing entrepreneurship competence in future professionals using self-management, as well as the most effective forms of its introduction (psychology workshops, video lectures, electronic portfolios). They claim that teacher education should prepare teachers for the effective use of the described technologies in the educational process. Importantly, all programmes for training, retraining and advanced training of psychology and teaching staff should include a self-management course. One of the key objectives of social and humanities-related education in P(V)E schools should be to prepare young people for the implementation of self-management as a technology of success.

In this regard, future research should aim to design and verify innovative teaching forms and methods aimed at enhancing the development of entrepreneurship competence in future professionals in P(V)E schools using self-education and self-management.

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# Teamwork as an interactive educational technology at pedagogical universities

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**Abstract.** A significant shift is taking place at higher educational institutions and emphasizes group or teamwork during the academic process. This article introduces incorporating teamwork into pedagogical courses. The application of the teamwork pedagogy is relevant due to a strong necessity to find a successful educational technology of professional teachers' competencies development required by the modern international labor market. Sufficient results have been achieved with the use of theoretical and empirical research methods as analysis, generalization, and systematization of scientific papers, observation, reflectivity, and social intelligence diagnosis, pedagogical modeling, questioning, and collecting data. The scientific novelty of the theoretical part is highlighted through the importance of applying teamwork as a more successful educational technology, proving effective tools, and strategies for designing the new teamwork-based educational process of master's degree students in Pedagogy. On the practical side, this new pedagogy has been applied in two universities, and it is concluded that teamwork can enhance problem-solving and creativity, generates understanding, support, commitment, acceptance, and bring out the best of the future university teacher.

## 1 Introduction

The need for a profound scientific research in the field of teamwork development is attributed to modern rapid socio-economic, innovative and educational transformations taking place in Ukraine, with the focus placed on young competitive staff who demonstrates both professional competencies and a number of communicative and personal qualities required by the labor market. Today, any modern university tries to implement various innovative projects in the academic process. So, there is a strong necessity to combine intellectual and cognitive efforts of university teachers to solve important educational problems. Therefore, these professionals should strive to cooperation, active participation in efficient pedagogical teams, where the members are characterized by cohesion, value-oriented unity, "coordinated positive synergy" (R. Abliazov et al [1]). Team members demonstrate their ability to work together, when a joint result is much higher than an individual one or, even, the sum of the results. They should have a developed sense of "we", be able to coordinate steps and actions in joint activities, maintain a high pace of work, understand and solve individual tasks to achieve a common goal by revealing their personal potential. Given the above, the training of future university teachers is closely linked with the search of new directions for the higher educational system's restructuring, in-

cluding the active implementation of team-building technologies, flexible methods and forms of teamwork in the process of their professional training.

## 2 Literature review

This article begins with a short review of the literature regarding teamwork issue. The problems of the formation and development of different professional teams and groups are considered in national and foreign scientific papers. Theoretical foundations of team building technologies are covered in the works of R. Abliazov [1], R. Belbin [2], A. Ivleev [3], A. Kariakin [4], D. Shakirova [5] and others. A more comprehensive description of the problem of interpersonal interaction as the basis of team building can be found in the work of psychologists (V. Horbunova [6], L. Fox et al [7]), a component of a group theory (G. Satran [8], L. Tompson [9]). This problem is of central interest as much recent research in the works of sociologists who identify synergetic effects of the team interaction (T. Galkina [10], etc.).

A number of authors have recognized the problems of team building and its development (V. Okuniova [11], G. Satran [8], L. Tompson [9], K. Shakhmayeva and L. Savva [12], and others). Some authors have driven the further development of team roles (V. Avdeev [13], R. Belbin [2], A. Karyakin [4], A. Panfilova [14] and others). E. Salas, D. Reyes and S. McDaniel [15] developed the scientific concept of teamwork where the progress, reflection and perspectives of this method were elaborated. Various aspects of team activities and human behavior in a team are

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revealed in the works of L. Aksenovska [16], A. Horbovyi [17], S. Tannenbaum, R. Beard, E. Salas [18], S. Schinko-Fischli [19] and others. The problem of teambuilding model which combines business and educational learning concepts attracted attention of some researchers as P. Lau, T. Kwong, K. Chong, E. Wong [20] and A. Doyle [21], who underlined the difference in the use of teams in business class settings compared to teams in educational class settings.

Most early studies as well as current work focus on teachers' team building work, which was the subject of the research carried by L. Karamushka [22], O. Fil [23] and others. While business and education share a common theoretical base, the implementation of the methods and techniques regarding teamwork are different. According to these approaches, there is no unified team model, but team members seem to work better when they are cooperating with each other. Therefore, the need for teambuilding methods in educational setting that combine task delivery with developing teambuilding skills seems evident.

Simultaneously the problem of teambuilding activities in the classroom can be used to weave together various experiences, contents, and viewpoints to promote communication, collaboration and respect. The issue of different activities that promote trust and build relationships by creating a respectful environment in which the participants can contribute at their individual levels of comfort was of interest of K. Greene in her research [24].

M. Loughry, M. Ohland and D. Woer elaborated the list of team skills and related interpersonal competences among which were the ability to work in diverse, multicultural environment, to think reflectively about the relationships between the students, underlying their importance and their value for future employers [25].

The problem of teambuilding development and teambuilding skills in college students was of interest of S. Marasi [26] and P. Lau, K. Kwong, K. Chong and E. Wong [20]. Teaching inter professional teamwork skills to health professional students was in focus of L. Fox, R. Onders, C. J. Hermansen-Kobulnicky, T. Nguyen, L. Myran, B. Linn and J. Hornecker [7]. B. Sairam, C. Sirisuthi and K. Wisetrinthong [27] in their findings showed that teambuilding leadership skills enhancement program have five toolkits, applying which the primary school administrators could manage their teamwork more efficiently and the overall progress of team building could become more successful.

To add more, the next step to the development evaluation system is the problem of assessment of teambuilding skills. The recent works of X. Zhuang, C. MacCann, L. Wang, L. Liu and R. Roberts [28] show the research results of the development and validity evidence supporting teamwork and collaboration assessment for high school students. Using such an approach to the problem of assessment E. Britton, N. Simper, A. Leger and J. Stephenson [29] developed a measurement tool to evaluate individual teamwork skills at higher school.

The current global pandemics has also been reflected in scientific investigations and the group of researchers C. Chakraborty, A. Sharma, G. Sharma, M. Bhattacharya,

R. Saha and S. Lee highlighted the importance of developing extensive partnership, collaboration and teamwork in academic settings to stop COVID-19 outbreak [30].

Although studies have been conducted by numerous authors, the problem of competence development of future university teachers' team interaction in the process of master's degree students' training is still insufficiently explored.

### 3 Research methods

To achieve the goal of the article, a set of qualitative and quantitative research methods was applied: *theoretical* - analysis, generalization and systematization of scientific data in order to develop theoretical foundations for the development of teamwork interaction competence of the future university teachers in the process of master's degree students' training; *empirical*: the method of "Need for Communication", the questionnaire of interpersonal relations, value scale method "Self-actualization test"; ratio competence diagnostics of knowledge acquisition and knowledge acquisition strength; observations, analytical maps of the level of team interaction skills, a questionnaire to determine team roles (R. Belbin [2]); methods of social intelligence diagnosis, empathy diagnosis method; methods of reflectivity diagnosis; pedagogical experiment (diagnostic, forming, controlling stages) in order to determine the efficiency of the target competence in the process of teamwork development among future university teachers during master's degree students' training.

Empirical data were collected at Alfred Nobel University (Dnipro), Classical Private University (Zaporizhzhya), Kremenchuk Mykhailo Ostrohradskyi National University (during 2018–2020), 16 staff members of the universities mentioned above and 154 Master's degree students who are obtaining second level (Master's degree) in the educational-professional program Pedagogy of higher education establishment in specialty 011 Educational, Pedagogical sciences participated in the experiment.

### 4 Results and discussion

Our research aims at finding a solution for this challenging problem. There is a clear conviction that team building is the basis for the development of a modern higher educational institution. The updated content of the principles of interaction, norms, traditions and rules of academic staff at the university has become possible thanks to the formation of teams of scientific and pedagogical staff; team spirit and systemic thinking formation, the desire for academic staff self-education activation.

Let's take a look at the phenomena "team", "teamwork", "team interaction", "team interaction competence of a future university teacher".

A profound analysis of scientific literature has shown that in modern science the team is considered by scholars ambiguously. It is defined as a group of people who complement and replace each other in achieving their goals (V. Avdeev [13], G. Lopatenkov [31]). A team is a collective entity of activities, the essence of which is the ability

to act as a whole, presenting team goals and values, actions, attitudes and behavior (V. Okuniova [11]); a small number of people who share goals, values, different approaches to implement joint activities, common and individual affiliation to a group (E. Salas, R. Berd, S. Tannenbaum [18]). A team is considered to be a group of people who have common goals, complementary skills and abilities, a high level of interdependence of its members, who share responsibility for achieving the final results (T. Galkina [10]); a small number of people who have complementary skills and are united to solve tasks together to increase work efficiency through which they maintain mutual responsibility (A. Kariakin [4]). To add more, a team is a group of two or more individuals who, to achieve a certain goal, coordinate their interactions and labor efforts, are united not only by job regulations but also by the norms of a higher order: goals, values, their own system of communication and motivation (A. Molchanova [32]). A team is a small group, which is characterized by a positive synergy of strong activities focused on solving team tasks (V. Horbunova [6]). So, this means that teams are characterized by internal self-organization, which is mainly based on informal relationships and can add some “chaos” to a well-thought-out team action strategy. Scholars emphasize the complementarity, mutual help of team members who are able to perform any internal group roles and take responsibility for the final results of their joint activities.

Indeed, the team is a group entity, the leading feature of which is the positive synergy of strong activities focused on solving team problems; competence of all team members; role advisability and mutually distributed responsibility, and comfortable interpersonal relations. Team members must have an awareness of the targeted goals of team activities (the overall goal of team activities should be closely reconciled with their own needs, the interests of the team members). That is, the overall goal of team members should be accepted at the motivational level; they must clearly adhere: to the principles of interaction among team members to achieve goals, the established role structure of the team, positions and functions of the leader; have the ability to self-reflection and self-knowledge acquisition, which ensures the development of a sense of belongingness to the team, unity with it and the formation of the image of “We”.

In light of the above, we understand the phenomenon of “team” as a group of people organized for a specific purpose who understand the interdependence and the need for interaction and cooperation. Team members should focus on joint, efficient and creative activities and be able to combine individual ideas and experience of each to make rational decisions and achieve common goal.

Another important finding in the understanding of the significant variety of forms and types of teams is as follows: natural work groups, self-managing teams, virtual teams [4, p. 28]. Regardless of the type of a team, the efficiency of its functioning is determined by the level of possession of the relevant knowledge, skills and abilities of its members.

Teamwork as a form of organization of mutual activity is inspired to achieve high efficiency of interconnected and

interdependent joint activities, based on high professionalism of team members who share team values, goals and mutual responsibility, have certain roles within which they can show their personal skills.

Teamwork as a form of organization of joint activities implies the ability to partnership interaction. According to psychologists, interaction is interpreted as the direct or indirect influence of entities on each one. Such an interaction generates team member mutual connection, and allows organizing and implementing some activities common to the collective entity. Therefore, the essential characteristic of teamwork is interactivity, which is revealed in the exchange of information between team members, ensures the synchronization, coherence of the pace and rhythm of joint activities, which leads to efficient work of the whole team and high dedication of everyone (L. Aksenovska [16], A. Kariakin [4]). The success of partnership is determined by the following factors: conformity of the behavior of the interacting people to the expectations of each other; adequate understanding of the situation and an adequate style of actions inside; the degree of involvement in team interaction of all participants of the process.

The variety of approaches is used to obtain the most efficient result of the teamwork. Problems that arise during teamwork are worked out in detail, decisions are agreed among members of a team; the team roles and functions of each member of the team are clearly distributed, the processes of internal and external team interaction are strictly regulated. As a result, in the process of a team development certain rules of behavior are developed, shared and supported by all participants.

It is clear that the efficiency of the teaching staff activities at the university depends on the level of cohesion and value-oriented unity. This can be achieved through the creation of a pedagogical team, the participants of which are linked by common goals, developed sense of “we”, and the values of pedagogical work.

The necessity of teamwork among university teachers is due to the fact that they often face the situations where: the task instruction is not clearly structured; a significant amount of work needs to be done quickly; the performance of a task requires creativity [10, p. 55]; it’s necessary to follow the collegial forms of decision-making, which increase motivation and dedication of all team members [17, p. 10], etc. Therefore, the university teacher has to possess team interaction skills.

Considering the above, and on the basis of careful studying of numerous scientific achievements of R. Abliazov [1], E. Aleksandrova [33], E. Britton et al [29], V. Horbunova [6], A. Doyle [21], O. Fil [23], L. Fox et al [7], K. Green [24], L. Karamushka [22, 34], S. Marasi [26], E. Salas, D. Reyes and S. Daniel [15], S. Schinko-Fischli [19], K. Shakhmaeva [12], L. Tompson [9], *team interaction skills* of a future university teacher is understood as *a stable, holistic, integrative building of a personality, which reflects understanding of the importance and the value of a teamwork, possession of a system of knowledge as to theoretical, factual and applied nature of a team, the ways in a teamwork, teambuilding technologies, gaining experience of the team interaction, the ability and readiness for*

*efficient activities in solving problems within the frame of dialogue communication and partner interaction with others due to a set of team interaction skills, developed social intelligence, and reflexivity.*

The university teacher's skills of a team interaction allows a specialist to combining individual ideas and experience of each team member to make a relevant decision and achieve a common goal; demonstrating responsibility and consistency of actions to solve the assigned educational and professional tasks; providing the teacher with self-control of role behavior and clear implementation of the developed rules of team interaction, professional and social demand in all fields of life.

The following structural components of the skills explored are highlighted as follows: motivational and axiological, cognitive, activity-oriented, personal, reflexive-evaluative, as well as a set of the criteria and their indicators.

*Motivational and axiological* component includes a need for the team work, recognition of the values of team interaction, awareness of the personal significance of the benefits of joint activities.

*Cognitive* component means the completeness and sustainability of theoretical, factual and applied knowledge covering the values of professional communication, team building and team interaction, the ways of work in a team.

*Activity-oriented* component determines the level of master's degree students' skills as a future team member and mastering the experience of team activities: to express own thoughts clearly and logically, share information; the skills to carry out the written electronic communication; set goals, structure own time; convince colleagues of the correctness of the decision, supporting thoughts with strong arguments; find non-standard solutions; admit own mistakes; be personally responsible for the results of work; establish efficient interaction among team members; successfully collaborate in virtual environment; achieve mutual understanding of team members, express trust to them; implement technologies to make joint decisions; manage own emotions; avoid and prevent conflicts.

*Personal* component is revealed in the level of social, intellect and empathy development.

*Reflexive-evaluative* component means the skills of reflection and behavior correction, which corresponds to team activities.

It's advisable to develop team interaction competence for training of future university teachers during masters' educational and professional programs, in particular "Pedagogy of Higher School" (Specialty 011 - Educational, Pedagogical Sciences). For this purpose, we have worked out the educational technology to develop the team interaction competence of future university teachers for master's degree students' training (figure 1). This technology is based on the following methodological principles: *systemic, competency-based, activity-oriented, personality-oriented, participatory and andragogical.*

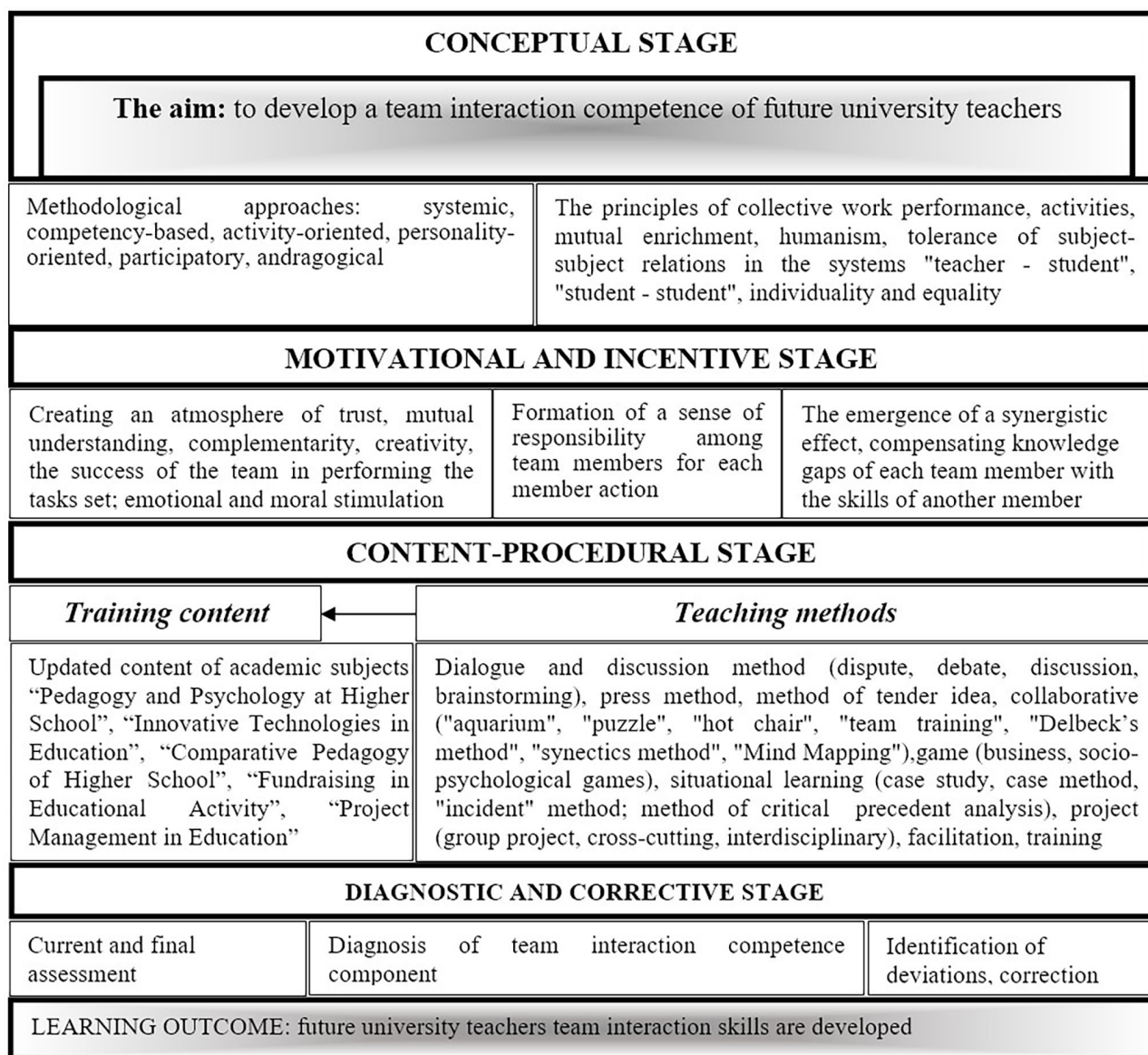
*Systemic* principle allows considering all components of professional education of master's degree students as a holistic social system. It describes the systemic characteristics of the process of forming target competence of team

interaction in organizational, pedagogical and professional aspects, implement the relevant combination of pedagogical tools, forms and methods of teaching. *Competency-based* principle allows us to consider such a competence of future university teachers' team interaction as a component of their professional competence, highlight the essence and content of competence components; focuses on the connection between the educational process at the university and the requirements of the external environment, strengthening the practical direction of the educational process. *Activity-oriented* principle focuses on the priority use of active and interactive teaching methods, and the use of knowledge and skills as means that contribute to the formation of algorithms of team interaction. *Personality-oriented* principle defines the student as an entity of educational activities, aims at creating optimal conditions for the comprehensive development of the student's personality, designing individual achievements in the varieties of team interaction by future university teacher (masters). *Participatory* principle requires the creation of conditions to form the students' ability to work together. *Andragogical* principle assumes the direction of the educational process to the needs and requests of master's degree students and reliance on the existing subjective experience.

In addition to general pedagogical principles, we consider to single out other teaching principles: *the principle of collective work performance*, which assumes that each member of a team performs a clearly defined part of the general task; *the principle of activities*, which requires the active participation of master's degree students in interactive training, creating situations of professional activities, and providing feedback. The principle of mutual *enrichment* means that team members have the opportunity to exchange information and could enrich their knowledge with new ideas. *The principle of humanism, tolerance of subject-subject relations in the systems "teacher – student", "student – student"* provides for the motivational direction of the university academic staff members towards the master's degree student – the future colleague; creates a favorable psychological climate in the relationship between a university lecturer and master's students, foreseeing the consequences of each word, look, gesture ("rimum non nocere") – "First of all, do no harm"; recognizes the uniqueness of the personality of each master's student; respects his/her dignity, trust, acceptance of his/her personal goals and requests. *The principle of individuality and equality* means that each individual is recognized as a unique personality who is equal among others to show his individuality.

The necessary condition to provide the formation of teamwork skills of future university teachers is to actualize the motivational and axiological attitude of master's degree students to team interaction, namely: create a favorable psychological environment, an atmosphere of creativity, trust, mutual understanding, complementarity; create conditions for the development of the need for joint activities, the acquisition of subjective experience of mutual activities; provide the formation of professional skills of a team member for master's students. This task is solved





**Figure 1.** Technology for the development of future university teachers team interaction skills for master's degree students' training

at the motivational and incentive stages of the technology through emotional and moral stimulation; combination of personal interests with team interests; formation of a sense of responsibility among team members for each member actions; appearance of a synergistic effect, when the multiplication of the intellectual efforts of one team member by the efforts of another makes it possible to unite a team to solve problems which are irresistible for one person or a group.

The content and procedural stage of the technology is aimed at the system of knowledge acquisition as to theoretical, factual and applied nature of the team, the advantages and disadvantages of teambuilding, the structure of team roles, the differences between individual and teamwork, the ways of working in a team, team building technologies, and gaining experience of team interaction. This stage provides for theoretical covering of such subjects as "Pedagogy and Psychology of Higher Education", "Innovative

Technologies in Education", "Comparative Pedagogy of Higher Education", "Fundraising in Educational Activities", "Project Management in Education" with learning material focused on the formation of a system of knowledge of a theoretical and empirical nature among master's degree students of the value, significance and the ways of working in a team. The results demonstrate that in the process of studying them there are all possibilities to create the best conditions for the development of master's degree students' team interaction skills through optimization of resources and opportunities in the framework of teaching each subject.

The technology provides for a set of teaching methods and techniques, forms of training organization that contribute to understanding of the essence of team interaction by master's degree students, aimed at their self-analysis as team members, self-determination and self-realization in team activities.

Now we are focusing on the leading teaching methods and techniques. First of all, these are dialogical and discussion methods of teaching: *discussion* ("The value of teamwork", "The best tactics and strategies of professional interaction", "Professional roles of a teacher in interaction", "Strategies for preventing and overcoming barriers of professional interaction", "What is the difference between real and virtual teams?"), a *dispute* ("Technologies of team building and self-development", "Teachers' teamwork in distance learning"), *debates* ("Teamwork is the path to success", "The team is a professional community of a high level of development, competitive in the labor market", "A team for tasks or tasks for a team? The pros and cons of different types of teams"), *brainstorming* ("Barriers of professional interaction", "Team leader is ..." [11]), *forum* "International Pedagogical Conference", *dialogue-exchange of impressions*, *dialogue-discussion*, *dialogue-conversation*, *polylogue*, "Aquarium", "Take a position", "Life situations", "Circle of ideas", *generating ideas method* "515"; *discussion techniques* (proof, argumentation, comparison, alternative); *techniques of productive feedback* (its descriptive nature and specificity, implementation in the context of the group according to current needs of the team members); *empathy techniques* (maintaining the conversation, activation of audience perception, fixing attention on the interlocutor, a benevolent attitude towards him and the topic of conversation, paraphrasing, reflecting the speaker's feelings to demonstrate his own interest and understanding, encouragement to continue the statement, summing up the results of the conversation).

The study provides for the use of the "press" method", due to which master's degree students could acquire the experience of a reasoned presentation of their thoughts: "I believe that ..." (position), "Because ..." (justification), "For example ..." (facts and arguments), "So, I think ..." (conclusions), "tender idea method", where teams of master's degree students discuss options to solve the problem on the principle of a "court", "commission", "closed expertise") and etc.

The development of teamwork skills is contributed to the performance of the team presentation by masters in the metaphorical form "My team of like-minded people", which allows them forming an idea of the team's structure and its common goal during the discussion; the ability to delegate authority to team members, distributing roles among team members; general planning of team activities; size of the team. Debating masters have the opportunity to gain knowledge that form the basis of team values and affect joint activities in a team (psychological readiness for joint activities; status, mutual responsibility acceptance by the team members; interconnection and interdependence of team members; mutual understanding, mutual assistance, a sense of teamwork unity, etc.).

The interaction of master's degree students during classes involves the use of various forms: work in dyads; rotational triplets; quadras as to the carousel principle; micro-groups; teams, which members have a common task, during free movement around the classroom and

meetings with each other to speak to group members who perform an individual task, etc.

Methods of collaborative learning are appropriate for the development of team interaction competence, namely, "Training in a team", "Puzzle", "Puzzle - 2", "Synectics method", "Delbeke's method", "Hot chair", "Mind Mapping". Such methods' implementation helps master's degree students realize, that success of the team depends on the contribution of each member to the overall solution of the problem [35].

The technology provides for the use of such games: business games – "Invisible thread", "Competition or cooperation", "Squares" (aimed at the active cognition of each other, mutual understanding of communication partners, "co-authorship", in which the experience of cooperation is actively acquired, the development of creative relationships); social and psychological games – "Desert Island", "Shipwreck" (aimed at demonstrating leadership strategies in a group with subsequent internal group discussion and the analysis of the conflict situations).

It's efficient to use the method of situational training – case studies, case method, "incident" method; method of critical precedents analysis, which contributes to the development of team interaction skills components.

Attracting master's degree students to project activities "is based on the joint (collective) activities of students aimed at achieving a specific goal ... which adds to the students' activity of an integrated and stimulating nature, forms their skills and ability to work in a team using the division of labor and roles, has an active social direction" [35, p. 266]. They provides them with the acquisition of primary experience in team activities, the consolidation of values and methods of a team to solve the project problems.

M. Bulanova-Toporkova notes that projects can be considered as "active targeted experiment" [36], which allows master's degree students forming the skills of a teamwork and their personal qualities (social intellect, reflection, ability to cooperate and empathy). The technology provides for the use of cross-cutting educational projects covering the entire course of the subject and interdisciplinary projects to implement which one needs to possess knowledge, skills and abilities in a number of academic subjects ("The synergistic effect of team activities", "Conspiracies to see you", "Scientific project", "Educational innovations of the 21st century", "Professionally important qualities of the teachers' team leader", etc.).

The choice of facilitation methods is due to the fact that they contain the significant opportunities. They increase the efficiency of the group decision-making process (situation analysis; identification of options, alternative solutions; selection of the best option), create and maintain a climate in the group (increase the level of involvement in the discussion process; stimulate initiative; encourage to personal responsibility for the process and result), provide exchange of experience among participants, promote personal development of participants. Within the technology suggested, the following methods will be appropriate: "World Café", "Open Space", "Analysis of Kurt Levin's forces field", "At the same

time next year”, “Search for the future”, “Positive change paradigm”, “Anti-brainstorming”, “Dynamic facilitation” and others [35]. The implementation of these methods ensures the creation of conditions for constructive interaction of master’s degree students, the choice of optimal methods, means and forms of interaction, ensuring a favorable moral and psychological climate, resolving and preventing conflict situations of professional interaction.

Now we would like to draw the main attention to the use of the set of trainings. Thus, the training of team interaction is aimed at uniting participants into a single coordinated team to efficiently solve the tasks [37, 38]. During the training, the level of motivation of master’s degree students towards cooperation is increasing. One could observe the formation of cohesion, compatibility of general and individual goals of professional activities; awareness and correction of features of role behavior in groups of teachers, increase in the level of positive perception of team members, trust and satisfaction with joint activities, develop a “team spirit” and solidarity, responsibility of everyone in the team, consolidate communication skills. The following exercises can become the basis of such a training [8, p. 73]. They include: introduction, following the rules, acquaintance, expectations, warm-up, reflection and summarizing. During the training we can apply mini-lectures, work in small groups, discussions, business and role games and various psychological exercises: “Chain” (aimed at forming an idea of the team and its characteristics, when each master’s degree student adds his own characteristic to the previous characteristic of the team), “Narrow bridge” (provides the ability to avoid conflicts and find consensus), “Butterfly effect” (allows to form an awareness that the actions of each team member affect the overall result), “Diplomat” (promotes the ability to find consensus and be tolerant to the thoughts of team members).

To add more, the developed trainings (“Corporate culture in a professional educational organization”, “We are a team”, “Communication and interaction in the teaching team”, “Constructive interaction and empathic behavior in conflict”, “Communication barriers of a university teacher”), skills and abilities, necessary to ensure teamwork are aimed at optimizing interpersonal relationships in the team, distributing team roles, practicing skills of joint problem solving, training efficient interaction in a conflict situation, improving the psychological climate in a team. The use of trainings should be based on the study of R. Belbin [2], which shows the ability of each team member to play one, often two, and possibly three or even four team roles. At the beginning of the training, it is advisable to discuss the types of roles and their placement in a team (figure 2 [2]).

During the training, master’s degree students must try themselves in all known roles, learn about their features, master the skills and abilities to perform certain professional tasks, which appear in the process of formation and development of the “team”, realized the importance of teamwork to improve the efficiency of their activities and achievement a common goal and common tasks. We realize that the condition for the emergence of synergy can

be the emotional involvement of master’s degree students, as well as the optimal structuring of the team and the role distribution of its members. In case of coherence, cooperation of natural features and abilities, goals, needs, feelings, knowledge and attitudes of team members we can expect the effect of emergence, which means the appearance in the team of such features that are absent in individuals who are the members of the team (this effect is denoted by the formula: “ $2 + 2 = 5$ ”).

We realize that each created team of masters will be effective if all its members know the goal for which the team was formed, realize the need of a team approach in joint activity, work with maximum effort to achieve high results of team work, perform a specific task to achieve team goals, provide the necessary support, feel personal responsibility for the overall result of the team.

Mandatory reflection of joint activity results involves answering the questions during group discussion: what form of activities is the most efficient? Why? Which activities generate a synergistic effect? How does it arise? or participation in the discussion: “It was important to me...”, “I overestimated...”, “I remember...”, etc.

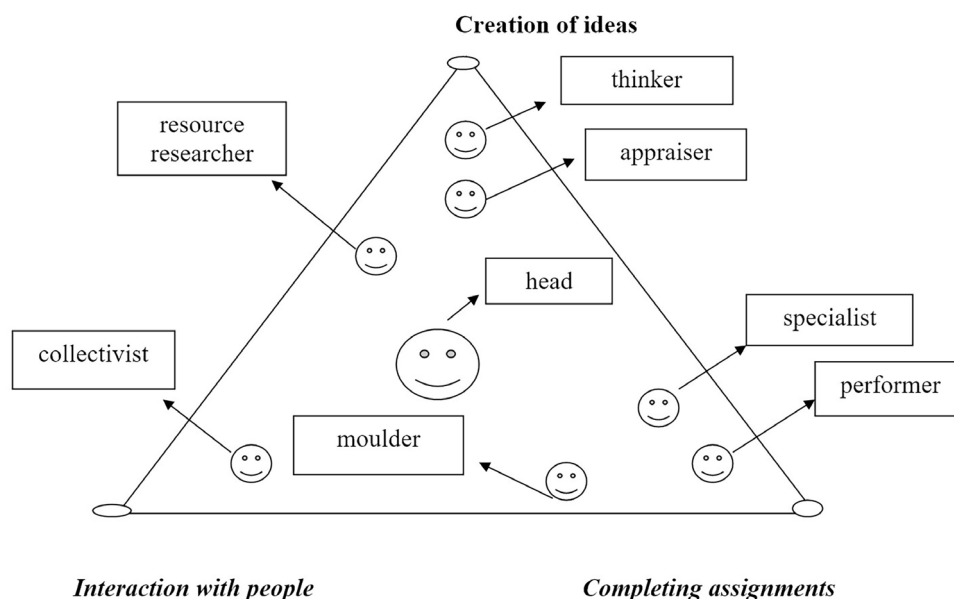
The basis to implement teamwork skills technology of future university teachers during master’s degree students’ training were such institutions of higher education: Alfred Nobel University (Dnipro), Kremenchuk Mykhailo Ostrohradskyi National University, Classical Private University (Zaporizhzhya). The participants of the experiment were master’s degree students by the specialty 011 “Educational, Pedagogical Sciences”.

The developed technology was carried out for two years (2018–2020 academic years). 154 master’s degree students were involved, among whom two groups were formed: experimental – 78 people (EG); control – 76 people (CG) (where the educational activity of master’s degree students was carried out with traditional for higher educational institutions’ methods and forms, a separate task to ensure the formation of skills in teamwork implementation was not set).

The results of the dynamics of level indicator changes of the team interaction skills component development for master’s degree students of the control and experimental groups are given in table 1.

The comparison of data of the level of team interaction skills components development for master’s degree students of the experimental and control groups indicates the significant positive changes at all the levels that have occurred due to implementing teamwork skills development technology for future university teachers during their master’s degree training.

Analyzing the data of the levels of development of the motivational and axiological component of team interaction skills (see table 1), it should be noted that for one and a half years there were some changes in control group, although quite insignificant. Some positive changes were found in master’s degree students who had a low level of development of the motivational and axiological component of the skills studied (from 42.1 to 32.9%). The similar changes are observed according to the following criteria: cognitive (from 50.0 to 43.5%), activities (from



**Figure 2.** Types and placement of each role in a team [2]

**Table 1.** Dynamics of indicators of teamwork interaction skills components levels for master’s degree students of control and experimental groups

Level	Group			
	CG (76 people)		EG (78 people)	
	Experiment stage			
	Stating	Control	Stating	Control
<i>Team interaction skills component</i>				
<i>Motivational and axiological</i>				
High	19.7	23.7	20.5	37.2
Sufficient	38.2	43.4	42.3	47.4
Low	42.1	32.9	37.2	15.4
<i>Cognitive</i>				
High	23.7	26.3	24.4	37.2
Sufficient	26.3	30.2	28.2	50.0
Low	50.0	43.5	47.4	12.8
<i>Activity</i>				
High	19.8	23.7	19.2	39.7
Sufficient	36.8	48.7	32.1	44.9
Low	43.4	27.6	48.7	15.4
<i>Personal</i>				
High	21.1	23.7	19.2	33.3
Sufficient	30.2	38.2	33.3	50.0
Low	48.7	38.1	47.5	16.7
<i>Reflexive and evaluative</i>				
High	23.7	26.3	23.1	38.5
Sufficient	43.4	50.0	47.4	52.6
Low	32.9	23.7	29.5	8.9

43.4 to 27.6%), personal (from 48.7 to 38.1%), reflexive-evaluative (from 32.9 to 23.7%).

According to the results found in EG, it is necessary to note that after the realization of the developed technology there were positive changes. Indicators of the motivational

and axiological component were: for a high level +16.7%, a sufficient level +5.1%, a low level -21.8%.

Regarding the dynamics of the levels of development of the cognitive component of team interaction skills, the obtained results indicate the significant positive changes. Thus, the number of master’s degree students, whose indicators are referred to a high level, has risen sharply in EG (from 24.4 to 37.2%). The growth accounted for +12.8%. The analysis of the obtained results showed that master’s students have knowledge of theoretical, factual and applied nature of the team, the advantages and disadvantages of teams, the role structure of teams, the differences between individual work and teamwork, the ways of working in a team, technologies of team building, gaining experience of team interaction. We can emphasize that the number of low-level masters has significantly decreased (from 47.4 to 12.8%). The growth amounted to 34.6. Comparing the data with control group, we have to note that there are some changes, but insignificant: high level – from 23.7 to 26.3%, sufficient – from 26.3 to 30.2%, low – from 50.0 to 43.5%. The indicators’ growth amounted to: +2.6%; +3.9%; -6.5%.

The significant changes could be observed at the level of development of the activity component. Thus, in CG the number of master’s students with a high level is 23.7% (compared to 19.8%), in EG – 39.7% (compared to 19.2%). The growth accounts for +3.9 and +20.5. As for the low level of development of the component under investigation, the EG growth was 33.3% (in control -15.8%). The obtained results indicate the efficiency of the chosen methods and forms of education, due to the implementation of which the master’s students have developed the ability to clearly and logically express their thoughts, to convey information; have written electronic communication skills; set goals, structure own time; convince colleagues of the correctness of decision, confirming



**Table 2.** Dynamics of levels indicators of teamwork interaction skills development for master’s degree students of control and experimental groups

Level	Group			
	CG (76 people)		EG (78 people)	
	Experiment stage			
	Stating	Control	Stating	Control
High	21,6	24,7	21,3	37,2
Sufficient	35,0	42,1	36,7	49,0
Low	43,4	33,2	42,0	13,8

their opinions with strong arguments; find non-standard solutions; admit own mistakes; be personally responsible for the results of the work; establish efficient interaction of team members; are able to successfully cooperate in a virtual environment; reach mutual understanding, achieve mutual understanding and coherence of team members; implement technologies of joint decision-making; manage own emotions; avoid and prevent conflicts.

Personal component indicators have also changed significantly. In EG, positive changes were observed at all levels: high level – from 19.2 to 33.3%, sufficient level – from 33.3 to 50.0%, low level – from 47.5 to 17.2%. Master’s students of CG showed insignificant positive changes at the level of development of this component: high level – from 21.1 to 23.7% (growth +2.6%); sufficient level – from 30.2 to 38.2% (growth +8%); low level – from 48.7 to 38.1% (growth -10.6%).

The diagnosis of the reflexive and evaluative component showed that in EG after having implemented the technology 38.5% of master’s students showed a high level of mastery of reflection skills, correction of behavior that corresponds to teamwork, which is 15.4% more than in the primary diagnosis. The number of low-level masters decreased by 20.6%. Changes in the control group are as follows: high +2.6%, sufficient +6.6%, low -9.2%.

At the end of the formation stage of the experiment, the study was conducted aimed at determining the dynamics of levels of skills development in the team interaction of master’s students of two groups (table 2).

Comparing the results obtained at the control stage of the experiment, we have to state that implementing teamwork interaction skills development for future university teachers during master’s degree training led to a sharp increase of the number of master’s students, which is attributed to high and sufficient levels of skills.

## 5 Conclusions and prospects for further research

Currently, the incorporation of teamwork into the educational process became a very important approach in enhancing the pedagogical courses at higher educational institutions, as this approach formulates a very beneficial means of interaction with the global challenges in the profession of a teacher.

Having concluded our theoretical analysis, Master’s degree students’ experiment and having compared and

contrasted data obtained, the results of the study demonstrate the following: the labor market today requires a specialist who could combine individual ideas and experience of each team member to make a relevant decision and achieve a common goal; demonstrate responsibility and consistency of actions to solve the assigned educational and professional tasks; provide the teacher with self-control of role behavior and clear implementation of the developed rules of team interaction, professional and social demand in all fields of life.

The findings of the study are supported by the fact that in addition to professional knowledge and skills, a future university teacher must have a system of teambuilding skills. Developing such skills is not a bargain, but an objective requirement of the labor market. The high school should respond to these requests.

Results provide the basis to distinguish the structural components of the skills explored: motivational and axiological, cognitive, activity-oriented, personal, reflexive-evaluative, as well as a set of the criteria and their indicators. The worked out educational technology to develop the team building competence of future university teachers for Master’s degree students is based on the following methodological principles: *systemic, competency-based, activity-oriented, personality-oriented, participatory and andragogical*.

The acquisition of basic knowledge as to theoretical, factual and applied nature of the team, the advantages and disadvantages of teambuilding, the structure of team roles, the differences between individual and teamwork, the ways of working in a team, team building technologies, gaining experience of team interaction and mastering the basic teambuilding skills for Master’s degree students in the specialty 011 Educational, Pedagogical sciences was facilitated by the following courses: “Pedagogy and Psychology of Higher Education”, “Innovative Technologies in Education”, “Comparative Pedagogy of Higher Education”, “Fundraising in Educational Activities”, “Project Management in Education”.

The technology provides for a set of teaching methods and techniques, forms of training organization that contribute to understanding of the essence of team interaction by Master’s degree students, aimed at their self-analysis as team members, self-determination and self-realization in team activities.

Through the implementation of dialogical and discussion methods of teaching using game teaching methods involving modeling of professional situations, joint analysis and problem solving, our results can demonstrate the ability of Master’s degree students to reflect on their own experience and individual characteristics necessary to develop teambuilding skills.

The interaction of Master’s degree students during classes involves the use of various forms: work in dyads; rotational triplets; quadras as to the carousel principle; micro-groups; teams, which members have a common task, during free movement around the classroom and meetings with each other to speak to group members who perform an individual task, etc.

To develop team interaction competence in Master's degree students of pedagogical university it is appropriate to use the method collaborative learning ("Training in a team", "Puzzle", "Puzzle – 2", "Synectics method", "Delbeke's method", "Hot chair", "Mind Mapping") and some facilitation methods (World Cafe, Open Space, Kurt Levin Force Field Analysis, Anti-Brainstorming, Dynamic Facilitation).

Superior results could be seen for some more pedagogical techniques, namely: method of situational training and project work, which involves the need of a team approach in joint activity, work with maximum effort to achieve high results of team work, perform a specific task to achieve team goals, provide the necessary support, feel personal responsibility for the overall result of the team.

The implementation of interactive teaching methods was aimed at the development of teambuilding skills in Master's degree students. But in order to successfully develop the ability to apply these skills in professional pedagogical situations, Master's degree students must practice them throughout their studies, as these skills tend to reverse.

Teaching teamwork skills in the education pedagogy will help master's degree students for better learning and will have many positives in developing the students' potentials and skills that are needed to confront the present and future challenges of the teacher profession. The methodology of incorporating teamwork into pedagogy is based on major strategies including: setting general teaching strategies; designing teamwork; organizing teamwork; and evaluating teamwork.

This new proposed guiding tool is recommended to be used by pedagogical universities as a means for managing a successful teamwork in pedagogical environment. Summing up, we should note that the use of technology of teambuilding skills development for future university teachers during master's degree training is quite efficient. It is a perspective problem for research in the future and could be studied at different levels of both components – the skills in the implementation of teamwork for students of different major and the phenomenon as a whole.

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## Training future primary school teachers for the formation of students' skills to cooperate in a team

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**Abstract.** The model of training future primary school teachers for the formation of students' skills to cooperate in a team is developed and experimentally tested in the article. There are the following components of this model: goals, methodological approaches, content (the structure of the ability to work in a team is considered), the main stages, forms, methods, means, diagnostic tools and the result of the studied training. The skills to cooperate in a team are explored in the article as a complex formation and as one of the soft skills. At higher education institutions, the future teachers training for the formation at primary school students' skills to collaborate in a team takes place mainly during the implementation of interactive, game and project methods. However, this training needs to be improved. The developed experimental model implies systematic work on the basis of Pedagogy of the Heart and Pedagogy of Success, as a methodological basis of the researched process; equivalence of tendencies of using group work to improve learning outcomes and group work as a means of formation of students' ability to interact. Experimental verification proved the effectiveness of the designed model: the number of representatives at a high level of readiness to develop primary schoolchildren' ability to work in a team significantly increased and there were no low-level representatives.

### 1 Introduction

We are at the stage of development of human civilization, when effective social transformations, development and implementation of startups, implementation of inventions in science, technology, medicine, information technology require the collective efforts of firms, enterprises, campaigns, research institutions. Increasingly more often we talk about teamwork and the ability to collaborate in a team, which should be formed as early as possible in children and youth. This skill is one of today's relevant soft skills.

The ability to interact is one of the key competencies of students in primary school, and therefore, the relevance of training future teachers at higher education institutions to form such competence in students is growing.

Due to the need to solve this problem, a number of unresolved issues arise: are we not in too much in a hurry when we develop the ability to teamwork in primary school students; are graduates of pedagogical specialties of higher education institutions ready for this process; what is the level of such readiness, what does it mean – to be able to work in a team?

Usually, both teachers and students-future teachers are convinced in the need of primary school students to be prepared to interact with others, because the level of formation of this competence defines later their abilities of self-realization and success.

At the same time, the analysis of biographies of famous people gives grounds for a more thorough study of this problem. Elon Musk was a victim of bullying at school, there were problems with peer interaction, but this did not prevent him from the establishment of a number of world-famous campaigns and tremendous success. The victims of bullying during the school years were world-famous people – motivational coach Nick Vujicic, film actor Christian Bale, pop star singers Taylor Swift, Miley Cyrus and others.

After all, we have examples when even great teachers felt oppressed by peers as children and were not great authorities, in particular the world-famous writer and teacher Anton Makarenko was a frail sick child, but later he became the head of a colony and then a commune for homeless children, being able to group the pedagogic and children's teams. These and other facts encourage the scientific research to address the issue of training future teachers to develop the ability of younger students to interact, cooperate in a team. We assume that the task of the school may be to give children knowledge, develop individual talents, personal qualities (diligence, decency, humanity,

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etc.) as a basis for their future achievements, and to train teachers for this mission. The scientific interest is focused on the resolution of problem as far as skills to cooperate in a team contributes to students' learning in conditions of pandemic.

## 2 Literature review

The ability of students to interact with each other and with other people, teams is associated in pedagogical theory and practice primarily with the implementation of interactive methods (group work, brainstorming, aquarium, etc.), project work and the formation of the class team. Interactive methods, their role in the development of collectivist qualities are the subject of research by A. De-Juanas [1], V. Esarte-Sarries [2], P. Fernández-Lozano [1], M. González-Ballesteros [1], L. Hargreaves [2], B. Kubicek [3], J. Moyles [2], U. Ordon [4], O. Pometun [5], M. Roger [2], M. Szczotka [6], K. Szewczuk [6], E. Wójcik [7] etc. The use of interactive and other methods of cooperation in a team in higher education institutions was described by M. Dgebuadze [8], E. Faciu [9], M. Giorgdze [8], I. Lazar [9] and others.

The formation of the ability to interact, learning in interactive groups is considered in terms of improving the learning outcomes, rather than acquiring the ability of multilateral communication. In particular, U. Ordon states that the use of interactive methods increases the effectiveness of learning, makes it more attractive, and facilitates the formation of skills. In combination with play, these methods increase the motivation to learn, which is important in the conditions of young age when a child starts learning [4].

Interdisciplinary learning, multifaceted communication during learning are considered not only in terms of strengthening knowledge, but also as links with social changes: it is considered as a means of developing social skills.

Collaboration and cross-discipline teaching and learning, for example through projects, team-teaching and learner-led activities, improves engagement and learning outcomes in a range of competencies. Cross-discipline learning also allows for strengthening the connectivity between the different subjects in the curriculum, as well as establishing a firm link between what is being taught and societal change and relevance [10].

Training future teachers for formation of soft skills (teamwork is a component of these skills) is considered in the works of A. Abdula [11], H. Baluta [11], A. Bohinska [12], D. Cretu [13], M. Hashimah [14, 15], D. Kassim [11], N. Kozachenko [11], R. Kravets [16], I. Mintii [12], H. Nor [14], O. Pehota [16], L. Romanyshyna [16], I. Shorobura [16], K. Tang [14, 15, 17], T. Vakaliuk [12], I. Varava [12], V. Vykrushch [16], etc. In particular, K. Tang, M. Hashimah, H. Nor offer to make changes in the content of future teachers training and to introduce an integrated module in professional training. "Since soft skills are important prerequisite in shaping an individual's personality, therefore it is recommended that teacher edu-

cators should utilize the integrated soft skills training module during teaching professional training" [14].

The analysis of the pedagogical sources allows to reveal interesting ways, methods which can be used in the course of training future teachers for the formation of students' ability to collaborate in a team. L. Budevici Puiu proves the necessity of change and development of the higher education institution in the age of globalization [18]. L. S. Tudor considers initial training of teachers for preschool and primary education from the perspective of modern educational paradigms [19]. K. Binytska, V. Chaika, O. Pysarchuk, I. Yashchuk et al. stressed the need to introduce Pedagogy of the Heart, despite E. Piecuch's attempts to consider it utopian [20].

P. Fernández-Lozano, M. González-Ballesteros, A. De-Juanas emphasize that cooperation is not just a way of learning, but a culture that should be integrated into interaction with others: "Cooperation is more than just a way of learning; it is a culture which should be integrated into how we interact with those around us" [1]; they offer to use interdisciplinary cooperation between teachers of different disciplines, encouraging them to create common teams; learning new technologies: "We consider that collaboration between teachers of different disciplines and with other professionals is desirable, to pool ideas on interesting projects and tasks involving interdependence and intended to develop basic competencies for the future professional careers of the students in different degree courses" [1].

"We consider that university teaching staff must be trained in the use of new technologies and that teaching centers should be equipped with the resources needed to enable cooperative work inside and outside the classroom" [1].

Teamwork of teachers is the subject of research by F. Dochy, E. Kyndt, E. Raes, K. Vangrieken [21, 22] and others. However, the wholesome issue of training future primary school teachers for the formation of students' ability to work in a team still is not studied thoroughly. There is a need to clarify the structure of the ability to cooperate in a team and substantiate the new ways of training future teachers for its formation in students.

Insufficient research of the problem and the necessity of a comprehensive solution to these issues determined the aim of the study: to develop and experimentally test the model of training future primary school teachers to the formation of students' ability to cooperate in a team.

## 3 Methodology

In order to solve the problem of training future teachers for the formation of primary school students' ability to work in a team, the retrospective analysis methods were used to search in the historical and pedagogical literature for promising ways of formation of these skills. There were studied the sources, which cover the ways of interaction of primary school students during the period of the second half of the XX till the early XXI century. These are primarily periodicals that describe the practice of the effective interaction between children in primary school.

Another important method is the experiment – the constative and formative one, which was conducted among graduate students of Mukachevo State University, Ivan Franko Drohobych State Pedagogical University, Volodymyr Hnatiuk Ternopil National Pedagogical University during 2019-2020. There were 202 students participating in the experiment. The control groups included 104 students; the experimental ones – 98 students. About 74% of students participating in the experimental groups already had experience as teachers in primary schools. Only one participant in the experiment was male; others – females.

In the process of the experimental work, the modeling methods were used in order to develop a model of training future teachers to form in students of primary school age the ability to collaborate in a team; questionnaires, surveys, testing, method of expert evaluation, interviews with teachers-specialists in primary education – to develop diagnostic tools and experimental verification of the effectiveness of the studied model.

The expert assessment during the experiment (indicators of motivational and valuable, resultative-analytical criteria) was carried out by the Deputy Dean of the Faculty of Pedagogy and Psychology; Head of the Department of Pedagogy and Methods of Primary and Preschool Education of Volodymyr Hnatiuk Ternopil National Pedagogical University and a Master course student who performed a Master's thesis on retrospective analysis of cooperation in a team of primary school students. The expert assessment was done by means of analysis of the results of realization of methods of "incomplete sentences", interviews and questionnaires. During the experiment students-future teachers answered the following questions:

1. What do you understand by the ability to cooperate in a team?
2. Is it worth to form the ability to cooperate in a team in primary school children?
3. How, in your opinion, it is possible to form students' ability to cooperate in a team?
4. Do you use the methods for diagnostic the formation of personal qualities, which are important for the cooperation in a team? If yes, which ones?
5. Do you feel yourself trained enough to form the ability of younger students to work in a team?
6. How do you think, teachers are able to work in a team?

## 4 Results

### 4.1 The structure of the ability to work in a team

The ability to work in a team involves mastering a set of different methods and techniques.

We asked the postgraduate students future teachers to choose the definition of the notion of teamwork. Students were offered the following answers as options:

- a) communicate effectively,
- b) not too conflict,
- c) perform a collective task with the whole group, not individual students, and
- d) your own answer.

The survey involved 96 people – both full time and correspondence department postgraduate students of Volodymyr Hnatiuk Ternopil National Pedagogical University; 98.96% of them were females; 1 person (1.04%) was a male. All the proposed options were chosen by 88 people (91.7%), indicating that this was the achievement of the goal by all participants, not individual members. The option to communicate effectively and not to conflict was chosen by 8 respondents (8.3%). In addition, 4 (4.2%) respondents wrote that the ability to work in a team was to help each other. A small number of students-future teachers who expressed a need of primary school children' support, caused the necessity to introduce the ideas of Pedagogy of the Heart.

To the question of how, in your opinion, it is possible to form students' ability to cooperate in a team, it was possible to choose the following answers: to teach in interactive groups; to involve students in the implementation of collective projects (educational and upbringing); to form harmonious relationships between students in the classroom; to bring up humanism, warm relations; to teach in communication to use strategies of cooperation, compromises; and to offer your own answer.

Only 24 students (33%) chose the option of "bringing up humanism, warm relations". Most often, students chose the option of "teaching in interactive groups; involving students in the implementation of collective projects (educational and upbringing)" – 60 respondents (62.5%); besides, only one option – "involving students in the implementation of collective projects (educational and upbringing)" was chosen by 8 students (8.3%), "teaching in interactive groups" – by 4 (4.2%).

We also used the method of "incomplete sentences" and suggested to finish the following sentence: "The ability to work in a team is...". The most interesting are the following answers, which demonstrate the depth of understanding this idea: "The ability to work in a team is the ability to perform a task set before a group of people through cooperation and effective communication"; "This is an activity that consists of actions aimed at achieving the goal. It requires leadership skills, such as the ability to influence people and be persuasive, to listen to the point of view of colleagues, to respect their opinion. It assumes the need to control one's emotions in order to cope better with most stressful situations. Communication skills play an important role in working with a team, the ability to understand everything that happens between people and inside of people, to understand the meaning of their actions, experiences, thoughts, aspirations, it's all important".

We asked students whether primary school children should develop the ability to cooperate in a team. Majority of students – 94 respondents (97, 9%) gave an affirmative

answer; 2 (2.1%) students answered “no, because there is no specially developed methodology for the formation of this skill”.

When asked if they feel ready to form the ability of younger students to work in a team, 8 respondents (8.2%) wrote “no”, 4 (4.1%) respondents wrote that they lacked a focus on the formation of such a skill, as well as a special methodology that would aim at the formation of such a skill. Students, determining the ability to work in a team, primarily focused on communication, the ability to resolve conflicts, involving all team members in the work, rather than active and competent individuals. Less often they wrote about managing emotions and helping each other.

Unfortunately, only 4 students (4.2%) of the participants in the experiment answered that the ability to work in a team consists of support, help each other, this is what we call the ability to interact on the basis of Pedagogy of the Heart (empathy, perception, and choice of this strategy of behavior).

None of the participants in the experiment wrote that the ability to work in a team is the ability to obtain the necessary information, improve knowledge, competence in the field in which the team works; these are reflective skills – the abilities to analyze the achievements and shortcomings of the work and predict work strategies. They did not write about self-improvement of personal qualities; while it requires personal qualities that are usually the decisive criterion by which we would or would not involve a person in our team.

Of course, this does not mean that such skills of intellectual, reflective or self-improvement are denied by students as necessary for teamwork. When students were asked about this, they agreed on the necessity of this skill. But they do not name the mentioned skills, only by teacher’s initiative.

After studying the opinions of student-teachers and conducting our own research, we determined the structure of the skill to cooperate in a team (figure 1).

Organizational skills – to set goals, develop plans of their implementation, time management.

Managerial skills – to distribute responsibilities, manage and obey team requirements.

Intellectual and information skills – to continue education, to obtain information.

Communicative skills – to communicate productively; prevent conflicts or resolve constructive conflicts.

Emotional-volitional skills – to control emotions, their inner state, to demonstrate volitional qualities.

Humanistic-oriented skills – the abilities to support and provide practical assistance, to penetrate into the essence of another person, to operate on a “heart to heart” principle.

Reflexive skills – the abilities of the in-depth analysis of one’s strengths, weaknesses, activities of each team member, intermediate results. Ability to draw conclusions and correct mistakes.

We asked whether the formation of these skills would be the only criterion for selecting a team of followers to perform a pedagogical assignment. At the same time, we found out that an important criterion was presented with

personal traits – honesty, sincerity, decency, humanity. Certain skills can be acquired if you are the respected person. We took this into account when determining the indicators by which we measured the level of readiness of future teachers to develop the ability of primary school children to interact in a team. Unfortunately, measuring the level of formation of these qualities is not paid due attention, as well as to the preparation of students for such diagnostic procedures. We set a task to eliminate this shortcoming in our study.

#### **4.2 Diagnosis of readiness of future teachers to form teamwork skills in junior schoolchildren**

Determining diagnostic tools for future teachers’ readiness to develop teamwork skills in junior school children is a process that takes into account a number of factors, especially the structure of teamwork skills, the results of our research, scientists’ approaches to diagnosing future teachers’ readiness for certain professional activities (for example, diagnostic, innovative, to the formation of the class team, etc.) [20]. Taking them into consideration, we identified the criteria, indicators and levels of readiness of future teachers to develop students’ ability to interact in a team, methods for measuring each of these indicators, showing them in table 1.

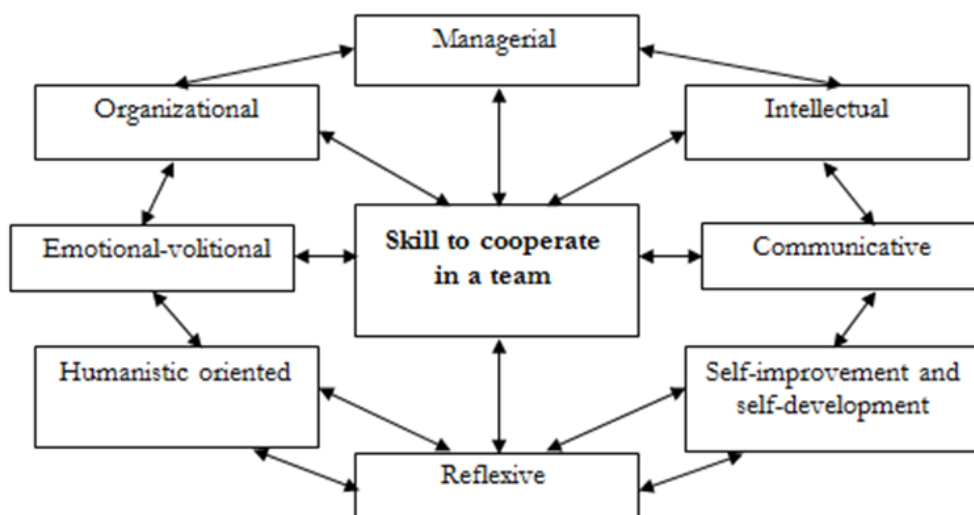
To measure the level of formation of each indicator, we determined the appropriate method, evaluating from 1 to 20 points. We assessed the level of formation of five indicators that characterize the readiness of future teachers to develop pupils’ ability to cooperate in a team. The maximum amount of points a student could be evaluated was 100 points. It corresponds to the scale according to which students’ educational outcomes (credits and exams) are assessed during the university study.

High-level representatives could score from 90 to 100 points; sufficient – from 75 to 89 points; satisfactory – from 60 to 74 points; low – from 1 to 59 points. This corresponds to the scale of student assessment during the examination sessions.

#### **4.3 Forms, methods, technologies of training future teachers for formation of skills of teamwork at primary school students**

Training future teachers for the formation of younger schoolchildren’s ability to collaborate in a team takes place in the course of study of all educational disciplines. The wide-spread methods in the educational process at university are interactive ones, including “group work”, “take position”, “aquarium”, “rotating threes”, “merry-go-round”, “thinking hats”, “brainstorming” and others. Game and project methods are also quite popular. These methods have a long history of development. They were applied for the first time centuries ago, or much earlier, in particular, the game method.

At the same time, a retrospective analysis of primary education in Ukraine made it possible to identify promising methods that are worth reviving in the educational process: the implementation of collective creative work;



**Figure 1.** The structure of the skill to cooperate in a team

**Table 1.** Criteria, indicators and methods for determining the indicators of readiness of future primary school teachers to form students’ ability to work in a team, (source: own work)

Readiness criteria	Indicators	Method
Motivational and valuable	Level of awareness of the importance of the studied skills and the development of personal qualities for teamwork.	Survey, questionnaire, interview.
Personal-diagnostic	The level of formation of diagnostic skills to measure the development of personal qualities necessary for the interaction of students: honesty, decency, sincerity, humanity, communicative skills.	Survey, questionnaire, interview.
Cognitive	Knowledge of forms, methods of teamwork; technologies, which are used to form a coordinated teamwork.	Tests.
Procedural	Level of realization of forms, methods of work.	Estimation of performance of educational affairs during pedagogical practice; interview.
Resultative-analytical	Assessment and self-assessment of skills formation, identification of prospects.	The method of incomplete sentences.

evaluation of the contribution into teamwork with the help of magic rulers; the student’s work at the blackboard in the special support team he/she had chosen; the use of a mat of reconciliation, on which children communicate in a friendly and constructive manner during reconciliation (for example, “Let’s work it out”); games “Kvach, give a hand”, “Two frosts”, which imply assistance to a classmate in a difficult moment, conducting classes like “Emblem of professions” (students in the “workshops” develop an emblem of the profession they represent), etc. The method of evaluation with the help of magic rulers in our study was adapted to the research topic. Students evaluated their contribution to the work of the team with the letters “A” – activity, “D” – diligence; “C” – creativity, etc. according to a 12-point scale (this is the rating scale used in schools of Ukraine).

Training future teachers for the formation of the ability of primary school students to interact in a team involves the use of not only traditional methods but also innovative ones. In addition, it is necessary to take into account not

only the positive potential of traditional methods, but also their negative aspects. Group work can take place with the activity of one or two students, and the others will only use the overall result; teamwork is noisy, and it requires a lot of teacher’s skills to organize it.

A new approach is emerged to the training future teachers in the context of developing the ability at primary school children to interact in a team in changing priorities: the equivalence of trends in group work to improve learning outcomes and group learning as a means of developing students’ ability to interact. We propose to emphasize the formation of teamwork skills for life self-realization.

The innovations of our experimental work at the university are its systematicity and complexity: focus on national and foreign both historical-pedagogical and modern achievements, ideas of Pedagogy of Heart and Pedagogy of Success; formation of students’ motivation to use teamwork and independent design of non-standard methods and techniques relevant to modern teamwork of schoolchildren and their reflection in the e-book; prepar-



ing students for diagnostic activities in the context of measuring primary school children's personal qualities that are important for teamwork; study of technologies, interesting methods, techniques of pedagogical theory and practice and their application during pedagogical activity; training for the formation of schoolchildren's reflective skills. Since students need a special method (system) of formation of primary school children's ability to interact in a team, we have developed a model of this process.

The model of our proposed system of training for the formation of primary school students' skills to interact in a team is shown in figure 2.

#### 4.4 Analysis of the results of the experiment

The experimental work was carried out in Volodymyr Hnatiuk Ternopil National Pedagogical University, Ivan Franko Drohobych State Pedagogical University, Mukachevo State University. In control groups (104 students) training was conducted in a tradition way. In the experimental groups (98 people) – according to the developed model.

The experiment, lasting 1 academic year, began in September 2019 and was completed in May 2019.

In September 2019, we conducted diagnostic procedures in experimental groups (3 groups; full-time and correspondence department). It turned out that 11 (11.2%) postgraduate students are at a high level; 47 (47.9%) – at a sufficient one; 33 (32.7%) – at a satisfactory one; 8 (8.2%) – at a low level. An experimental model was implemented in these groups.

At the first stage – motivational and goal setting – motivation was created to form the ability to cooperate in a team, the advantages it gives, the achievement of modern teams, including schoolchildren and universities. It was noted that this skill was determined by The Council of the European Union in a Recommendation on key competences for lifelong learning [23].

At the second – diagnostic-informative stage – approaches to the interpretation of the notion of teamwork, the requirements of standard programs for primary school in terms of the ability to interact were comprehensively studied; as well as the forms, methods, tools and technologies suitable for use at the primary school in the context of teamwork. We didn't only teach students to use interactive, project, game methods, etc., but also prepared them to use these methods in schools as a means of developing teamwork skills [24]. Emphasis was made on diagnostic procedures: tests, including humorous ones: Who am I? What am I?

Interesting tasks in the context of teamwork, in our opinion, are: games "Captain" (ship crews are created to study recreational facilities; there was not only a distribution of roles, but also a cost estimate was prepared within the given limits); "Delicacies in support of a friend" (pre-supposed role distribution, choice of the delicacies to be prepared, team implementation and money estimation to be raised in order to treat a friend), "Green Tourism" (implied creation of several teams to provide recreational services; the winners were determined judging by quality-

price correlation; however, each team won in different nominations), "Sherlock Holmes" (one of teams produced a text with deliberately made mistakes, the other team – found them and corrected) and others. The students discussed experimental researches over the past 50 years devoted to the formation at pupils' ability to interact, but whose ideas still remain relevant. The researchers noted that children with a selfish orientation, when acting as a leader, behave in an organized, intelligent and restrained manner; if they were offered to obey – their style of behavior changed dramatically, escalating a conflict. The students interested in the selected types of children with features of local collectivism (humane only within their group) and group selfishness (in their group – disorganized, and in the transition to "foreign crew" the situation got even worse), as well as the proposed methods of influencing on children. The researchers recommended to apply methods of persuasion to disorganized students, as well as to search for their interests and provide assistance in the development and realization of the child's capacities [25].

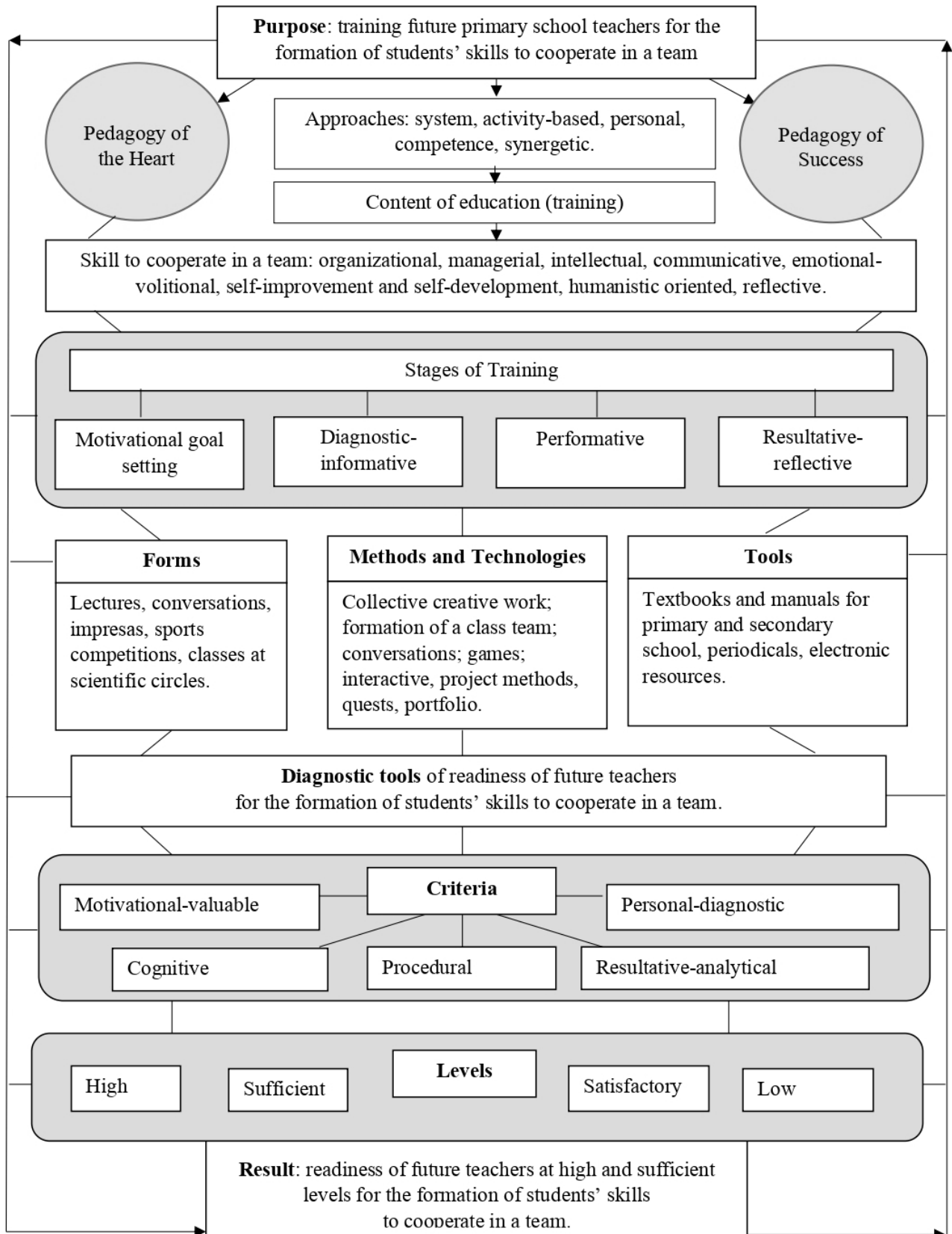
Significant attention in the study was paid to training students for the realization of humanistic potential in the team, mutual assistance, giving support of each child, as well as the impact on timid students who show signs of "learned helplessness", known since the 1960's, and described in the works of C. Peterson, S. Maier, M. Seligman [26].

We also implemented the ideas of students that were indicated at the stage of the questionnaire. Those with an interesting experience of schoolchildren teamwork (both positive and negative), shared it at the classes and online.

We analyzed the examples of famous people who were bullied as children and who did not make friends with peers. We came to the conclusion that such children need help. After all, not everyone has got enough courage to face the circumstances. Sometimes children commit suicide because of bullying. Therefore, while forming the ability to interact with others, it is necessary to emphasize the need to follow the law and respond correctly to all cases of its violation.

In the questionnaires at the beginning of the experiment, students were asked the question: "Do you consider teachers to be ready for teamwork?". Only 20 (20.8%) out of 96 students gave an affirmative answer. Others said teachers were ready rather than they were not.

This response, as well as the results of the research, prompted the use of teamwork of both teachers and students, which was implied at the third – the performative stage of the developed model. Teams of teachers and students were formed as a result of scientific research, presentation of the faculty to applicants, when they made choice of their future profession; during faculty events; competitions of social projects. We started the experiment when there was no threat of the Covid-19 pandemic, and finished it during the pandemic. Some tasks (discussion of virtual classes in primary school, implementation of diagnostic procedures, etc.) had to be performed in a team. Based on interviews with students, it was concluded that a number of educational tasks, such as project implemen-



**Figure 2.** Model of training future primary school teachers for the formation of students' skills to cooperate in a team

**Table 2.** Distribution of students of experimental groups by levels of readiness to the formation of students' ability to work in a team (formative stage of the experiment)

Levels	Distribution of students by levels	
	Before the experiment	After the experiment
High	11 persons (11,2%)	33 persons (33,7%)
Sufficient	47 persons (47,9%)	46 persons (46,9%)
Satisfactory	32 persons (32,7%)	19 persons (19,4%)
Low	8 persons (8,2%)	-

**Table 3.** Distribution of students of control groups by levels of readiness to the formation of students' ability to work in a team (formative stage of the experiment)

Levels	Distribution of students by levels	
	Before the experiment	After the experiment
High	12 persons (11,5%)	14 persons (13,5%)
Sufficient	48 persons (46,2%)	51 persons (49,0%)
Satisfactory	35 persons (33,7%)	31 persons (29,8%)
Low	9 persons (8,6%)	8 persons (7,7%)

tation, problem solving, portfolio creation, e-books, manuals, teamwork, work with a partner, are a temporary alternative in conditions of pandemic to school lessons and classes at the university. Group forms of work, work in pairs, in students' opinion, contribute to the development of motivation to learn, the development of social skills, especially mutual assistance and support in the conditions of pandemic stronger than in the context of usual learning. However, this is no more than a temporary alternative, as far as the real learning is more effective than the virtual one.

At the last stages of the experiment (resultative-reflexive) the students were asked to complete the sentences.

I'm ready to develop teamwork skills in elementary school because... However, I still lack the skill of...

I feel that I am not quite ready to develop skills in students... (After the experiment: 33.7% of postgraduate students were at a high level; 46.9% – at a sufficient level; 19.4% – at a satisfactory level; 0% – at a low level).

The results of the experimental work are presented in tables 2 and 3.

The results of students of control groups (104 persons) almost did not change.

The results of future primary school teachers readiness to the formation of students' ability to work in a team of control and experimental groups confirm the effectiveness of the developed methodology.

## 5 Discussion

The results of the experiment testified to the effectiveness of the developed experimental model. But, in our opinion, a change in priorities in the interpretation of the ability to cooperate in a team is the main achievement.

Before the experiment, students-future teachers paid more attention to the ability to distribute responsibilities, perform a collective task with the whole group, and after the experiment – to the ability to support each other, provide practical support, say a sincere word of praise. So, cooperation on the ideas of Pedagogy of the Heart became the main thing. Before the experiment, only 4 students (4.2%) of the participants in the experiment answered that the ability to work in a team is support, help each other. After the experiment, all members of the experimental group mentioned first of all help and sincere compliments as manifestations of the ability to cooperate. The participants of the experiment learned more about the ideas of Pedagogy of Success and Pedagogy of the Heart and their significance in the educational process of educational institutions. At the same time (32 students of the experimental group – 32.7%) noted that in the conditions of competition there is a negative tendency to show qualities that contradict the ideas of Pedagogy of Heart (envy, deception, manipulation, etc.).

We provided the results of the experiment for acquaintance and use to students and lecturers of Vasyl Stefanyk Precarpathian National University, Yuriy Fedkovych Chernivtsi National University. They admit that the results were interesting to them, somewhat unexpected, but worth studying and implementing. There were identified discussion questions about helping a person in a team that is likely to become a competitor in the future; feelings of inferiority among people with a higher level of competence.

Considering the problem of training future teachers for the formation of primary school students' ability to cooperate in a team, we found out that the following tasks require further comprehensive research: genesis of this problem; the formation of soft skills in primary school students; overcoming obstacles as to the formation of students' ability to cooperate in a team.

## 6 Conclusion

The ability to work in a team for primary school students is a complex formation that contributes to the formation of key competencies for life, and requires special training for future teachers. A person who knows how to work in a team has a number of skills: organizational, managerial, intellectual, communicative, emotional and volitional, self-improvement and self-development of personal qualities, humanistic, reflexive. According to the research, a significant proportion of future teachers (approximately 40%) is not sufficiently trained for the formation of this skill in primary schoolchildren and they are at a satisfactory or low level of readiness for such activities. Thus, there is a need for systematic work, which is reflected in the experimental model: the introduction of the ideas of Pedagogy of the Heart and Pedagogy of Success as a methodological basis for the process; the application of the potential of all educational disciplines; preparation for wider use of diagnostic procedures; search and implementation of promising non-standard methods and techniques of teamwork of school children; mastering modern technologies and methods of teamwork; creation of

teams of teachers and students for scientific searches, career guidance work, events and festive theatrical performances. According to the research results, as a result of the introduction of the experimental model, there is not a single student who is at a low level of readiness to develop primary schoolchildren' ability to work in a team. The number of high-level representatives has significantly increased (tripled): from 11 (11.2%) to 33 (33.7%), which testifies to the effectiveness of experimental work.

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## Foreign language virtual teaching optimization: sensory-somatic enhancers as an alternative to rational and emotional ones

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**Abstract.** Based on the use of potentials of human analogue thinking and cognitive effects as an indispensable component of the cognitive activity, the article considers atypically located in the frame structure and suggestively loaded rational and emotional motivators for learning a foreign language. The article focuses on sensory-somatic enhancers of the new information reception. It is shown that stimulation of the analogue language learning is mostly successfully carried out with suggestive or emotional motivation, as well as through visual, audio, kinesthetic channels alongside with the verbal one during games. It is proved that such games were used in the history of human ontogenesis. Game resources of virtual reality are considered as new stimulating suggestions, since a game is a way to detach from the profane in favor of the sacred information space. The ways of optimization of virtual foreign language learning by means of sensory-somatic enhancers are described.

### 1 Introduction

Observing the foreign languages learning process in the context of globalization, intensification of the information flow and the improvement of digital reality shows that the triad “teacher – the language being studied – student” is rapidly being modified into the dyad “the subject mastering the language – the language being studied.” The role of the mentor in relation to the personality is steadily decreasing in all spheres of human activity, including the sphere of acquiring new knowledge. Since language retains its status of the main intermediary between a human and the world, only the personal resource of the subject mastering the language can be emphasized in the processes of language learning intensification – moreover, the virtual learning channel is steadily turning into a dominant one. The process of acquiring new knowledge, including the study of foreign languages, is an objectively time-consuming process. Using the personal resource of the subject, organizers of the educational process are required to turn the learning process into a funny and effective one using optimal tools. This task prevails in terms of new challenges that humanity faces, like the current situation of COVID pandemic. This determines the relevance of the study.

Self-study has always been regarded as an important way of learning a foreign language. A major aim of education is to prepare students to continue self-directed learning throughout their lifetimes. In our rapidly changing world there has appeared a need for a paradigm shift in the perception of learning. In this connection a wide range

of educational concepts has been developed with the focus on self-study: self-directed learning, self-determined learning, self-regulated learning.

A person is regarded as an active system capable of self-regulation and self-organization [1]. The concept of “self” is an important motivational value. Self-regulation constructs nicely integrate the cognitive, motivational, social, and behavioral strands of theory and research [2]. People are not conscious of the cues that control a great deal of their behavior [3]. Learners’ self-direction is defined as the ability for self-directed and self-regulated independent learning processes [4].

The self-studying (autodidacticism) paradigm seeks to find out the ways of influencing a person that bring the “system” to a new favourable path of development; it is self-managed and self-sustaining. In its broadest meaning, self-directed learning describes a process, in which individuals take the initiative, with or without the assistance of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes [5]. Among the benefits of students’ self-study are the following ones: improved academic performance; increased motivation and confidence; greater students’ awareness of their limitations and ability to manage them; enabling teachers to provide differentiated tasks for students.

In the era of the dominant digital learning, the role of self-study in the process of learning foreign languages is steadily increasing; this requires a search for original forms of optimizing the process of acquiring knowledge, increasing its effectiveness, and activating the learners’ personal resources.

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As a natural effective enhancer of learning a foreign language, we have studied analogue human thinking and the resource of cognitive distortions. The proper use of both significantly reduces the time spent on mastering a new language. The following previously obtained conclusions appear to be fundamental in optimizing language learning. Firstly, knowledge of one of the languages of the language group (English in the Germanic group, Latin in the Romance group, Ukrainian or Russian in the Eastern Slavic group) significantly reduces the time of learning the languages of the same group using the principle of analogy – of high, medium, low associativity or full analogy (represented by international vocabulary). Secondly, very good results are achieved by the implementation of the dissociative principle in the formation of special interest in dissociates in terms of the increased focus on attractive objects (mastering lexemes denoting cultural unique things, or, on the contrary, ethno-specific forms denoting cultural universals). Thirdly, the principle of analogy in language teaching in the fields of associates and dissociates is highly effective taking into account the resources of cognitive effects, i.e. the characteristics of deviations of human thinking from cognitive impeccability in getting to know the world, and in this case, cognitive effects are considered as a reserve for accelerated language learning. Fourthly, cognitive illusions, in particular, the illusion of quick mastering a language, facilitate the frame-discursive use of the language in pragmatically significant situations, with inevitable errors, but maintaining high communicative relevance. The main conclusions regarding the possibilities of analogue learning are presented in a number of studies [6, 7]. Analogue learning forms the platform of immersive learning, since it involves obtaining real experience in a real environment, blurs the line between theory and practice, brings language learning and solving everyday problems as close as possible. Analogue teaching through virtual channels is quite promising as an immersive learning platform.

Awareness of the prospects of analogue (associative and dissociative) teaching and frame-discursive use of the language raises the question of stimulating the learner to speed up language learning through rational, emotional and especially sensory-somatic immersive technologies (immersion technologies with an evident effect of sensory perception), primarily augmented reality technologies [8], highly-demanded today in the advanced areas of communication, namely telecommunications, political, advertising, medical, in the art sphere, and even the religious one. All of them are directed to the sub-consciousness, they are suggestive in nature and require effective modification of motivators.

The sensory-somatic approach is relevant as a learning tool in general, but it is especially promising for learning foreign languages, not because the language contains a significant number of lexemes, the meaning of which contains the somatic component, but because a language, the most important human marker, is mastered by sensory channels, which can and should perform the common function of channeling information, enhanced by the capabilities of the computer, in digital learning conditions.

One of the advantages of immersive technologies – significant cost savings for learning at the expense of replacing the teacher in the process of learning by 3D object should be complemented by an increase in the effectiveness of teaching, i.e. the effect of mastering the material should not be the result of not so much the use of technology as the use of simple augmented reality technologies in progressive methods of teaching a language.

The aim of this study is to identify ways of effective modification of motivators for learning foreign languages – traditional (rational, emotional) and new – technologies of augmented reality in learning foreign languages using the resources of sensory-somatic enhancers, similar to the games of the New Code of Neuro-Linguistic Programming (further referred to as NCNLP games). To achieve this goal, we set the following objectives:

- a) to summarize the research efforts on traditional (rational, emotional) motivators for learning foreign languages and, through a survey, determined the place of sensory-somatic enhancers among others for learning,
- b) to determine the role of sensory-somatic enhancers in traditional methods of teaching foreign languages,
- c) to identify the perspective of using sensory-somatic enhancers in modern virtual learning technologies by analogy with the NCNLP games, found their cognitive prototype in children's games,
- d) to determine the possibility of quick identification of student belonging to the group of dominant sensory perception on the basis of the results of students' questionnaires,
- e) to find out the main directions, ideas following which it is possible to provide a synergistic effect of analogue teaching and augmented reality methods, including sensory-somatic enhancers.

## **2 The state of the problem: the role of virtual technologies in teaching a foreign language**

With the advent of the digital space and virtualization of teaching, the process of mastering a foreign language has undergone significant qualitative changes due to the emergence of new immersive technologies. With the view of technological advances, the educational process is required to meet the demands regarding new forms and tools of training students, integration of an individual into the national and world culture. Students, in their turn, develop and demonstrate their level of professional and IT knowledge as well as skills adequate to the modern level of science development.

Due to the digital age and appearance of new virtual technologies the processes of teaching and learning foreign languages have undergone drastic changes. Everyone is now mastering new ways of processing information as the main resource of development. This process has not only technological but also social significance. We

are experiencing a historic period of rapid technological changes, the emergence of new information technologies, virtual communication, computer/mobile equipment, and mastering modern IT tools. This process influences all spheres of life, including education. Analogue teaching practices are more and more often replaced by digital ones. This fact causes the change regarding the role of a teacher, its shifts from providing the content, giving ready-made knowledge to content facilitation and researching using the Internet and special software.

Nowadays, on the one hand, technology offers the flexibility to use a combination of tools and methods to help students absorb new information and, on the other hand, IT offers many powerful tools for teachers. The benefits of using IT in language learning/teaching are obvious; it is interactive, meaningful, and measurable. Multimedia content is widely applied in virtual reality tools. According to Bent B. Andresen and Katja van den Brink, videos, images, sounds, animations and simulations can be effectively used in a meaningful way due to their interactivity and flexibility [7].

Among virtual technologies that have gained on popularity m-learning [9–11] and cloud computing technology [10, 12, 13], digital video games [14, 15] can be mentioned. Virtual technologies are particularly relevant to language learning/teaching due to the fact that they present language learners with situations similar to those found in the real world [16, 17].

The development of systems analytics and digital technologies made it possible to search for learning enhancers outside the common space of the mind or consciousness: “Natural selection creates complex functional machinery without mindfulness; evolution lies inside the space of optimization processes but outside the circle of minds” [18].

Among new forms of transmitting educational information in the framework of the global information computer network, we have analyzed specialized sites, video training, mobile applications, single and multi-user video games, social networks aimed at communication of native speakers of the languages studied [19–22]. All of them are capable of stimulating the learning of a foreign language to a different extent, but their stimulating potential, in our opinion, is significantly inferior (due to ontogenetic formation) to the effectiveness of sensory-somatic enhancers, which are promising for analogue teaching of a foreign language. The use of suggestive techniques in the learning process also plays a significant role.

It should be recognized that it was long ago when scholars and teaching practitioners dealt with teaching foreign languages through the use of sensory-somatic enhancers. Even a group of extensive methods of teaching foreign languages, based on the acceleration of learning due to a quantitative increase in time, technical teaching aids, study material, etc., included methods based on two sensory systems – such as audio-lingual and audio-visual methods.

The audio-lingual method involves multiple listening and subsequent pronunciation of speech patterns of any length up to the automation of speech structures reproduction; the method is based on the use of records on infor-

mation carriers of any type and assumes relying on the auditory canal of perception. The audio-visual method involves mastering the language through oral dialogical speech, reproduction of the sound pattern as a single sample (sound, intonation, stress, rhythm), but dialogic speech is presented not in a situation of direct communication, but by means of off-screen accompaniment of filmstrips. The method presupposes relying simultaneously on the auditory and visual channels of perception; it is based on imitation, memorization and reproduction by analogy. The off-screen accompaniment of filmstrips can be considered as an early and simple form of using the possibilities of augmented reality when teaching foreign languages. These forms were even more widely used in teaching using intensive, or suggestive, methods based on the principle of accelerating learning per unit time by appealing to the reserve capabilities of the human psyche.

Suggestive methods in the broadest sense include two sensory-oriented ones. This is the method of gnosodrama, drama-pedagogy, the essence of which is the implementation of the learning process in the conditions, firstly, of the unity of verbal and non-verbal communication components, and secondly, active actions of students, situational role mimicry and improvisation, thirdly, high emotional intensity, fourthly, exaggerated clear articulation of the text, which generally resembles the performance of a drama on the stage. One more method is situational, or Hi-Tech, method that presupposes training using the Internet communication based on visual, audible paradoxical situations (based on aphorisms, jokes, etc.) in the course of interactive communication that promotes learning lexical and semantic connections of words. Augmented reality technologies (like a colorful image of sacred situations – fairy tales – or profane – a meeting of two friends) when used with the Hi-Tech method are enriched by immersive technology resources (e.g., the movement of a student or movement of his/her arms and legs is imitated).

Suggestive methods in the narrow sense include several ones. It is a method of suggestopedia, going back to the teachings of G. Lozanov (Bulgaria). “The basis of suggestive training, according to Lozanov, is based on three basic principles: 1) the principle of joy, absence of tension and concentrated psychorelaxation, 2) the principle of unity of the conscious – paraconscious and integral brain activation; 3) the principle of suggestive relationship at the level of the reserve complex” [23]. The activation of the reserve abilities of the psyche takes place under the conditions of using favorable learning conditions, in particular, the musical background (especially Baroque music), which is considered as attracting extraneous audio signals for accelerated language learning.

The suggestive cybernetic teaching method should also be mentioned. It was developed in the 1970-80s by V. Petrusinsky (Russia). This is a method of immersion in the language environment when you need to master the language quickly. The average development period is 8 days, 15 hours a day (to learn the language from scratch; two such courses were conducted with an interval of 2-3 months). The stimulus material was introduced in a large

quantity, very quickly, using strobe lights and movie cameras, and was repeated several times. The video was accompanied by the texts of psychotherapists providing relaxation for a student. The method is called “suggestive cybernetic” because the training was carried out using cybernetic means that activated the unconscious components of mnemonic activity – a system of special techniques that serve to facilitate memorisation. This method went down in history as one of the effective methods of teaching foreign languages precisely thanks to the aggressive and massive use of augmented reality technologies.

Among the intensive methods of suggestopedia in the narrow sense, the rhythmopedic method developed in the 1980s by G. Burdeniuk (Moldova) should also be mentioned as a method of using sound effects external to the subject, which are nevertheless effective for teaching. The method is based on the sensory rhythm stimulation of a student who is in a state of hypnotic sleep. Rhythm stimulation is the action on the human psyche of low-frequency impulses of color, sound, touch, which are perceived by analysers of the corresponding type – visual, auditory, kinesthetic. The material introduced in this way is remembered three times faster and stored two to three times longer than the same one when using other methods.

We have studied the suggestive potential of impetus for learning foreign languages. Impetuses are verbal (rarely nonverbal) enhancers for actions aimed at motivating a person and forming the desire for creative behavior. Impetuses have always played a significant role in learning foreign languages, however, with the development of the Internet, this role has increased, and the nature of enhancers has changed. The specifics of modern virtual impetuses preconditioned by the use of suggestive techniques, has two features.

Firstly, as a part of the impetus, the suggerend anchoring phase is prolonged and the trance induction/utilization phase is reduced or the last two are aligned with the anchoring phase, as in the text given below, where anchoring is combined with trance induction and partial utilization, and only the last echo phrase represents utilization “in its pure form”: “In our life we set goals many times, achieve them and set new ones. The ability to overcome obstacles begins with small victories over oneself and one’s laziness. Foreign language lessons, like nothing else, show us what form we are in. Being engaged in the learning process only 15-20 minutes every day, you are guaranteed to succeed in learning and experiencing what it is like to be a winner. Do not miss your chance” (<https://www.hosgeldi.com>). This requires reconstructing the anchoring map as the main component of the motivator text frame. A rational map of anchoring is based on ratiogens, including promises, goal substitutions, implanted motivators and anticipations; the emotional anchoring map is based on emotions, including stroking, slogans and chants, truisms, intrigues, attractions, analogue texts, appeals to authority, majority opinion or precedent texts, and sensorogens. The emotional and rational maps are balanced: the emotional map contains a smaller number, but higher variety of anchors, the rational map contains a quantitatively bigger number of anchors which are represented in a smaller variety, i.e., the

emotional map “underruns” the rational one. Let us pay attention to the significant role of the emotional component as a part of motivators and the presence of sensorogens as a part of the emotional map (as “new knowledge early in the morning invigorates better than the contrasting shower!”; “Our memory is subject to training even better than our muscles”).

Secondly, the classical structure of the motivational communication frame (“Let the students preparing for the seminar today read a new article on the history of cognitology in the library hall”) has been preserved. However, its interpretation in motivating texts has undergone significant changes in the direction of strengthening the positions of time and purpose. They are dependent on actions/states, and reductions of the subject and object positions, and not fixed positions of attributes and space. For example, “today you have 1440 minutes. Use them wisely. Spend at least five minutes on self-study.” An analysis of the texts of online motivators for learning foreign languages in terms of built-in means of suggestive influence showed their significant number and variety, as well as a two-channel (rational and emotional) influence even in modern unsophisticated pragmatically oriented works of a petty form, due to the influence of a stable pedagogical tradition.

Thus, it is fair to say that historically the use of suggestive motivational and teaching methods, the sensor and somatic code has occupied a worthy place among teaching methods in the framework of extensive and, especially, intensive methods of teaching foreign languages. However, there are spheres where sensory-somatic regulators in the process of training have demonstrated their extremely high potential.

### **3 NCNLP games as a tool for enhancing human cognitive activity**

Sensory-somatic stimulation is an educational modification of the NCNLP game, which is based on ontogenetically determined resources of the human central nervous system and body, in particular, on the conclusions as for the three-layer structure of the human brain, which incorporates the reactions of the reptile brain, which controls respiration and pulse; mammalian brain, which controls the limbic system, basic functions and emotions, and the human brain [24].

The doctrine of the existence of four types of people’s “imagination”: visual, audible, motor, or kinaesthetic (according to modern ideas, the last group includes gustatory and olfactory as the dominant sensory modality), as well as the fourth one, verbal (audio-digital), is known to have been introduced in the 19th and early 20th centuries by W. James [25], and since then this doctrine has acquired features of completeness.

The NCNLP games were proposed by G. Bateson, an Anglo-American anthropologist and system analyst who combined communication theory with modern advances in cybernetics. One of the ingenious ideas embodied by Bateson was to find correlations in the game between sensory and mental reactions: “All of these considerations



work together to set the mind in special relation to the body. My arms and legs obey one set of laws and equations in terms of their purely physical characteristics – weight, length, temperature, etc. But, chiefly owing to transformations of quantity... my arms and legs obey quite different laws in their controlled motions within the communication systems I call “mind” [26]. According to Bateson, the game is a conventional name: “... play is a phenomenon in which the actions of “play” are related to, or denote, other actions of “not play.” ... the evolution of play may have been an important step in the evolution of communication” [27]. As sensory modality is a genetically long-established human response to a stimulus, including speech stimulus, Bateson’s NCNLP games, created in the second half of the 20th century, combined speech stimulus and visual (Rainbow game), tactile (Alphabet game, Square Breathing game), auditory (Alphabet game) ones, potentially – all three, which cause sensory support and speech stimuli reinforcement, simultaneously the harmonization of the interaction of the hemispheres and suggestively conditioned unloading of the subconsciousness. Today there are dozens of such games.

Games are one of the most important sources of NCNLP – a system of creative self-improvement, self-management, personal development, the ability to manage one’s own states, ensuring harmonious interaction between conscious and unconscious, making quick intuitive decisions. The purpose of the NCNLP game is to achieve a “highly productive resource state”. This is an outwardly oriented dynamic trance state, similar to creativity, a state of “pulling in the flow”, abandonment of intense exclusively conscious search for a solution, a state of waiting for spontaneous exit from the subconscious during conscious meditation, when the right and left hemispheres (systemically distributed and holistic, detailed and holistic, analytical and creative, figurative) of the brain are harmonized to a greater extent than usual, a balance is established in the treatment of the situation by the conscious and unconscious. A highly productive state is achieved in order to activate all the resources of the human brain, all human sensory systems, especially representative ones (visual, auditory, kinesthetic); activation of both hemispheres of the brain for parallel processing, adjustment (scaling) of the existential code to the creative one [28].

It should be noted that today the flow theory of the M. Csikszentmihályi, known for his research on the phenomena of creativity and subjective happiness, “flow states”, which provide satisfaction from all activities, has gained considerable interest. The state of flow is the opposite of entropy (nothingness, chaos, “sleep of the mind that generates monsters”, according to F. Goya), the optimal state of harmonization of mental and physical “I” of a person, which provides job satisfaction and high results, a state of positive experiences created by controlled emotions, feelings, impressions, a state of complete situational involvement in activities that bring maximum satisfaction, “Happiness, in fact, is a condition that must be prepared for, cultivated and defended privately by each person” [29], it begins with “control over consciousness”. “In flow we are in control of our psychic energy, and everything

we do adds order to consciousness”. Thus, a person in a flow state is capable of rapid creative mastering of new knowledge, including mastering of new languages, and the researcher’s task is to find effective mechanisms for introducing a modern recipient into the flow state (see [30]). It may seem surprising, but analogues of children games can act as a sensory channel for introducing a learner to the flow state.

#### **4 Traditional children’s games with the use of sensory-somatic stimulation as an ontogenetically formed tool for enhancing human cognitive activity**

It is believed that the genius of Bateson allowed combining verbal and sensory codes to ensure a highly productive resource state of the brain. Bateson’s contribution is undeniable and rather significant. However, we drew attention to the fact that such games in large quantities contain children game communication. Games based on sensory-somatic enhancers are among the most interesting and complex ones; they are inherited from generation to generation.

This statement is true for children games, where audio reproduction of a verbal text involves tactile stimulation. In the East Slavic region, there is Horned Goat Is Coming game (“Ide koza rohataia”) where a playful and threatening voice is accompanied by the rotation of two fingers spread like horns, or Grey Bunny Is Sitting game-saying (“Sydyt zaichyk sirenkyi”).

This is especially true for the most popular children games for seniors and teenagers. In the East Slavic region, it is a game of verbal-audio identification, Chinese Whispers game, which involves the perception of an audio verbal signal and its transformation based on losses in the communication channel during the transmission of many participants in the chain. Losses are predictable and often intentionally stimulated, i.e. losses in the audio channel stimulate the appearance of a new verbal signal for the sake of which the game is played.

Verbal-visual identification games are based on a combination of verbal and figurative visual codes. Guess What It Is game can serve as an example, when one thinks of the subject, and the other has to guess which one, based on the questions, the answers to which are only “yes” and “no”: “Is it a living being?” – “Yes, it is.” “Is this a plant?” – “No, it isn’t.” “Is this an animal?” – “Yes, it is.” “Is this a mammal?” – “Yes, it is.” “Does it have 2 paws?” – “No, it doesn’t.” “Does it live on land?” – “No, it doesn’t.” “Is this a dolphin?” – “Yes, it is!”

Verbal-kinesthetic identification games are based on a combination of verbal and kinesthetic codes. My Wooden Cap game is based on the repetition of the quatrain: Ukr. “Kovpak mii derevianyi, / Derevianyi mii kovpak. / A yakshcho ne derevianyi, / To tse ne mii kovpak!”. Then the presenter asks not to say the word “mii” (my), but to replace it with a gesture (point to yourself). Then the word “kovpak” (cap) is replaced by a gesture: touching the forehead, the word “ne” (not) – by shaking your head, the word

“derevianyi” (wooden) – trampling of the feet. There are a lot of similar rhythmic kinesthetic games.

In East Slavic game culture, more complex phenomena are observed, such as the game of complex verbal-visual-kinesthetic identification, Three-Liter Jar game (one of the participants says aloud the first letter of the alphabet “a”, and then silently continues to count: Ukr. “b”, “v”, “g”. The other participant must say at any time, “Stop”). Everyone will name words starting with the letter where the player has stopped. Moreover, they can give only those words that can be placed in a three-liter jar.

Undoubtedly, similar games exist in other cultures of the peoples of the world (e.g., My Wooden Cap game is equivalent to the English one “My hat, it has three corners”, Swedish “Min hatt, den har tre kanter”, German “Mein Hut, der hat drei Ecken”, Spanish “Mi gorro tiene tres puntas”, French “Mon chapau a quatre bosses”, Hebrew “La Kova Shelie Shalosh Pinot”, etc.).

Similar games are used by adults – to ensure stress resistance, for example, in the military sphere French Relay Race game [31], to train memory by learning mnemonics and skim reading (the task is to read the text quickly while clapping the hands, touching the tip of the nose with the right or left hand in turn, simultaneously drawing a square on the floor by one foot, silently counting from 10 to 0, while perceiving a loud story of the lecturer on the theory of the question).

As we can see, kinesthetic signals dominate among the sensory-somatic ones. This result correlates with the established opinion that kinesthetic impressions were ontogenetically dominant, and not visual and auditory ones, which today are often included in the list of the most important sensory-somatic reactions. Although in the times of ongoing digitalisation we observe the intensification of the process of recoding the information perceivers into visual learners.

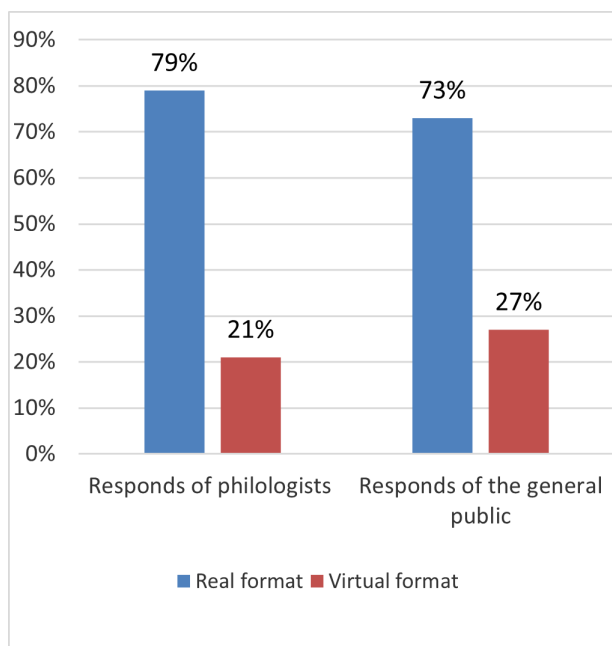
## 5 Methodology of teaching foreign languages using sensory-somatic enhancers

Introduction of a person to the state of flow should be an important task in learning a foreign language. Experience shows that an important tool for achieving this is, in particular, language acquisition due to the use of sensory support, which is possible by relying on ontogenetically formed traditions of children games described above and analogues of the NCNLP games.

To assess the significance of sensory-somatic enhancers, we conducted two surveys.

Respondents of the first survey were philologists, bachelor students majoring in Russian Language and Literature, Foreign Language (30 students) and Translation (30), graduate students of the second year (12) and users of two messengers – Viber, WhatsApp (30). Respondents were given a questionnaire consisting of several questions.

As for the first question “What form of learning a foreign language would you choose as more promising – a real or virtual format”, the answers of philologists were



**Figure 1.** Preferences concerning learning language format

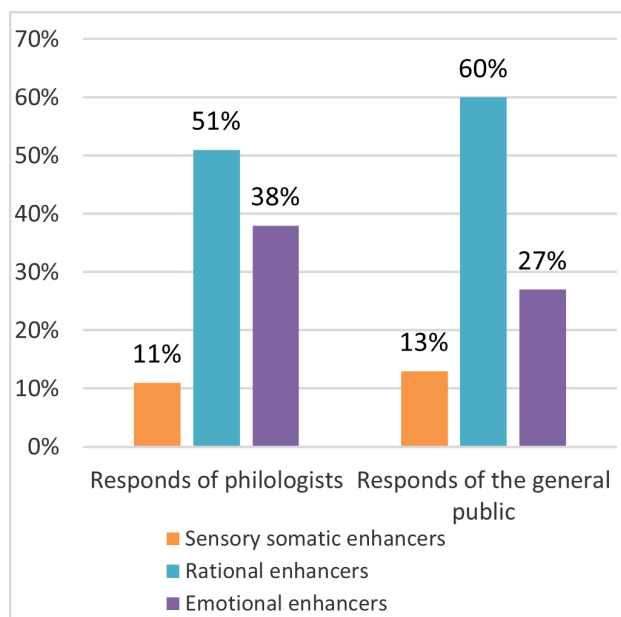
distributed in the ratio of 79% (real format) and 21% (virtual), answers of general respondents – 73% and 27% respectively (figure 1). Mankind is obviously moving towards the assimilation of information mainly through virtual channels, but the answers have shown that the prospects of learning through virtual channels are not yet realized by either philologists or the general public.

As for the second question “What motivators do you think are more effective in stimulating the study of foreign languages – sensory-somatic, rational or emotional” (2 examples were given), the answers of philologists were distributed as 11%, 51%, and 38%, and those of the general public – respectively 13%, 60%, and 27% (figure 2).

It follows from the answers that sensory-somatic enhancers (as well as emotional) are perceived as less effective than rational, which traditional pedagogy is based on, that means that rational enhancers are fixed by consciousness, emotional and especially sensory are less noticeable, i.e. potentially more effective in learning.

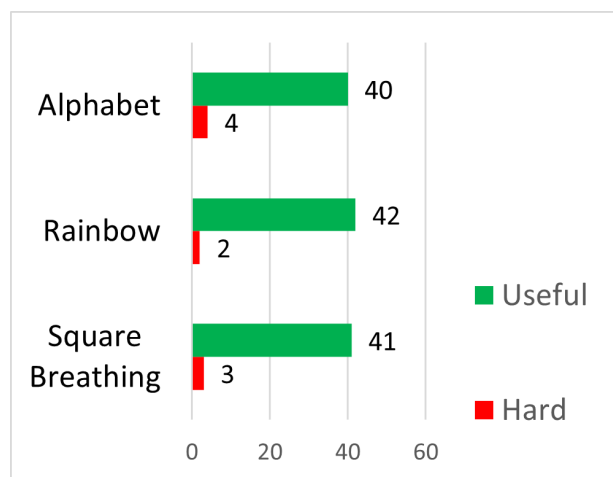
The respondents of the second survey, conducted in Taras Shevchenko National University of Kyiv in 2019–2020, were PhD philology students of the second year of study (34 people), and MA students of the second year of study (8 people) who took a course in Linguistic Programming of Human Behavior. Its programme presupposed learning three leading NCNLP games (Alphabet, Rainbow, and Square Breathing). Conducting this study, we set two goals: firstly, to assess the effectiveness of games based on sensory somatic stimulation aimed at decluttering the mind overloaded with mental activity and harmonize the activities of the hemispheres of the brain; secondly, to search for analogues of these games among the children games of the respondents.

Typical comments from PhD students included the following. Alphabet game (a game of simultaneous naming



**Figure 2.** Preferences concerning stimulation

the letters and synchronous raising of the right, left hand, or both hands at 90 degrees angle) is interesting, exciting, stimulating; it activates visual and spatial perception, synchronizes the hemispheres well: it is easy to perform both analytical and creative tasks after the game (10 answers). Rainbow game (in terms of dissonance of the color scheme of the background, the verbal name of the color and the color of the name itself it is necessary to name the color on the basis of the name of the real color of the object) is a great game that helps not only distract and “unload” the mind, but also train attention and, therefore, harmonize both hemispheres, it causes a feeling of the “brain” rest from all thoughts, a feeling of emptiness, the impression of a seemingly bifurcated consciousness, a pause from reloading work that requires constant concentration and nervous tension; a gambling game that qualitatively distracts from any other thoughts, after playing it there appears a feeling of “empty thinking”, as if there were no thoughts in the head (11 answers). Square Breathing (breathing for 7-8 minutes according to the scheme inhale – pause – exhale – pause counting to five in each phase) is a very interesting exercise that aims to calm and concentrate the personality on the inner state; enter a state of complete relaxation with absolutely detached thoughts, when thoughts are focused only on breathing and numbers; is the most pleasant, similar to breathing exercises in yoga, very similar to meditation, a good method of overcoming anxiety, rather designed to improve blood supply and increase oxygen levels in the brain, which will quickly enable to achieve a highly productive state; after a few minutes of that exercise, you feel relaxed and restored, as if returning from somewhere to this world; the feeling that you have managed to completely distract yourself from everyday thoughts and worries; the feeling after this game is similar to the feeling after Rainbow game; it brings a feeling of calm, rest, “empty head” (11 answers). PhD



**Figure 3.** Audience reactions to the NCNLP games

students easily found in memory similar children’s games confirming the G. Bateson’s opinion that conscious perception has the properties of the image [32]. The reactions to the games are presented in figure 3.

When asked to find analogues for games in childhood, we received positive responses with extensive comments and examples from 42 respondents out of 44 (95.5%).

Thus, the NCPLP games perform the role of decluttering the tired mind and harmonizing the right and left hemispheres of the human brain. Many years of experience of using these games in the classroom and reflections have led us to realise that they are a complete analogue of historically formed, established and systematically used games for children, and therefore, can serve the purpose of productive learning and simultaneous unloading of consciousness, including foreign language learning. Such experience exists. The expansion of virtual technologies in the learning process was considered in detail in the works by some authors [33], the use of immersive technologies [34]; the transition to multimodality in teaching was considered by A. Zamkov [35]; method of multimodal interaction using games was considered by Lv et al. [36]. In Russia and Ukraine, augmented reality technologies were extensively studied as a means of learning a foreign language [22, 37–39]. We consider the last of the directions to be extremely promising.

In Ukraine, when teaching foreigners the Ukrainian language, productive and interactive tasks similar to the Rainbow game are used, such as: printing students cards with the names of colors that name each color on colored paper of another color and the task is to name the color in which the word naming the color is written. Likewise, tasks similar to the Alphabet game are used: auditory recognition of words belonging to a certain thematic group, based on chaotic naming of words, presupposes raising the right hand, only in case if that word belongs to the chosen topic, and raising the left hand if it is referred to any other thematic group. But these simple techniques will acquire a different quality if you use immersive technologies that are actively advancing in the educational pro-

cess, but rarely take into account the resources of sensory-somatic reactions of a person.

Augmented Reality is the simplest, most effective (due to active sensory-somatic involvement in the learning process) and ergonomic (reducing time and improving results) kind of immersive technology. It complements “Real” Reality with virtual codes – from verbal to static or dynamic (animation) virtual images, which cause mental, sensory-somatic reaction of the student at the same time, similar to the reactions of NCNLP games and their analogues. The essence of augmented reality is to introduce to the network of cognitive perception of the student the results of sensory processing of the world to improve the perception of information. Three stages of training on the basis of Augmented Reality technology are offered: preparatory, non-situational training and the stage of frame situational training.

Teaching a foreign language using the sensory-somatic code and principle of analogy involves at the preparatory stage the division of group students into three subgroups on the basis of self-identification regarding belonging to the carriers of visual, auditory, kinesthetic “predicates”, understood by the NLP representatives as verbal objectification of a particular information system, or a representative system based on sensory data.

The possibility of such self-identification was controlled in the group of 16 students of the 3rd year of study. Students were offered lists of potentially used “sensory predicates” in public speaking, divided into three parts of speech. Students were requested to determine their type of the representative system, indicate the level of identification difficulty (from one to three) and the time spent on identification. Predicate lists were compiled on the basis of a selection from the dictionary [40], shortened and presented in equal numbers (about 300 objectifications in each block). E.g. the following ones:

- *A visual predicate block.* Nouns: stage, shine, vision, visibility, business card, appearance, flash, signboard, gallery, eyes, decoration, distance, painting, curtain, mirror, sign, show, eyesight, image; verbs: advertise, shine, splatter, peer, gaze, look, modify, look, look out, dress up, grimace, obscure, peep in, stare in wonderment, paint over, smudge, get dirty; adjectives/participles/adverbs: openwork, neat, artistically, asymmetric, faceless, cloudless, boundless, hopeless, shapeless, colorless, splendid, faded, catchy, prominent, visual.
- *An audio predicate block.* Nouns: accent, applause, bass, silence, conversation, howling, grunt, exclamation, harmony, dialect, voice, dialogue, discussion, dispute, dissonance, dialing; verbs: accompany, applaud, drum, bang, keep silent, talk, chat, mumble, mutter, gurgle, grumble, yell, screech, howl, roar, squeal, listen, coo, exclaim, call, shout out; adjectives/participles/adverbs: voiceless, unconditional, speechless, soundless, melodious, chatty, blatant, grouchy, aloud, harmonious, deaf, loud.
- *A kinesthetic predicate block.* Nouns: automatism, agony, adaptation, atmosphere, fragrance, impressions,

depth, hunger, bitterness, density, pressure, smell, stench, itching, heartburn; verbs: weigh up, wave, freeze in, stink, sweat, swell, rub, squeeze, push, trample, grab, gnaw, burn out, exhaust, swallow, drag, dig deep; adjectives/participles/adverbs: fragrant, painful, tasteless, close, tasty, wet, half-starving, deep, hungry, hot, bitter, rough, pungent, burning, harsh, etc.

The answers were as follows: identification difficulties were classified as minimal (one on the scale from one to three); the time spent on determining one’s own representative system ranged from 5 to 12 minutes; three visual, ten auditory, and three kinaesthetic learners were presented in the control group (identification error may be due to the dominance of auditory forms of control of students’ knowledge at this stage of language learning on the bachelor’s level).

At the stage of non-situational teaching of a foreign language according to the sensory-somatic code, the creation of a three-variant educational computer program for the study of associates and dissociates on the basis of fixing mental reactions by sensory ones is envisaged.

The simplest version of the program involves supporting the identification of associates and dissociates visually (for visual learners), audibly (for auditory learners), kinesthetically (for kinesthetic learners).

Simple forms of visual support can be coated (except for traditional – bold, underline, italics, color) on the background of emoticons, GIFs (Graphics Interchange Format), images in the PNG (Portable Bitmap Format), and APNG (Animated Portable Network Graphics) formats. Auditory support can be provided by the same resources as complex forms of visual support, but with the accompanying sound. Kinaesthetic support can be provided indirectly – through a visual representation of tactile action (approving or disapproving).

It seems efficient to consolidate the result using gradation – in the form of an increasing positive reaction. The easiest option is to fill the scale, as a result of which the student gains access to a certain achievement, manifested in the form of a collectible (1) / opening the next level (2) / bonus content (3). For consistent incorrect answers, such accumulation will be superfluous, since it will provoke a stressful state. Filling in the progress bar can be accompanied by a number of effects that are relevant for each form of sensory perception. So, it is visually easy to use the gradation of the brightness of the inscriptions or the background, as well as static images with signs of approval (JPEG), emoticons, stickers (PNG), animations (GIF). For the audio channel, this can be a sequence of phrases voiced (!) with an increase on the level of enthusiasm (good-great-excellent-perfect + yeah, nice, yep ...). The repetition of the same sound signifying success becomes irritating over time. A positive kinaesthetic reaction within the framework of the modern development of publicly available technologies can only be mediated, therefore, through visualisation, it is worth demonstrating only approving actions on an increasing basis (handshake, patting on the shoulder, hugs, etc.).



Interruption of the line of correct answers is also easily accompanied by appropriate signals. Visually, this can be a reaction of another (traditionally red) color, a step back in increasing brightness, zeroing the scale, and also other described objects with a negative value. Auditory, it is a short unpleasant signal (as an option – a car horn), a voiced phrase of the class nope, try again, not really. It is important to avoid reactions like bad or terrible, leaving room for humour or student support. Kinaesthetic, in this case, is the use of vibration response of the devices, which is obvious.

The need for a reward system is an important detail in such games. Mastering a language (progress in learning it) itself cannot replace a full-fledged in-game reward.

Firstly, obtaining a set of collectibles that reflect various achievements appeals to the desire for completeness. Such a collection can include awards for mastering the topic, N correct answers in a row, N days of using the application without gaps, etc. It is also worth collecting statistics on all participants in order to demonstrate to the player that he answered the questions of the level, for example, 80% better than the rest.

Secondly, access to the next level only after completing the previous one is a practice that is relevant only when a thorough study of the topic is extremely important, when the skipping will really negatively affect the progress.

Finally, thirdly, bonus content is the most positive incentive option. Even the mythical cartoon at the end of the old electronic *Just You Wait* game made children spend hours repeating repetitive actions. Players strive to get something extraordinary, even if it costs them a lot of effort. In this case, access to interactive stories based on dissociation that will be both interesting and useful for students can be a great option.

All the methods of sensory influence described above were chosen taking into account the technical side, i.e. based on the current capabilities of wearable devices. The choice in favor of mobile devices over stationary ones (home PCs or specially equipped stations in the classroom) is due to their availability, popularity, and the possibility of constant use [21, 41–43]. Wearable devices can also be an excellent aid in learning pronunciation and speech recognition at the level of a native speaker. The use of technology to solve this problem was raised by Igarashi & Wilson [44]. Modern mobile devices already know how to “talk” with a person, that is implemented in the function of the voice assistant Google Assistant, Siri, Alexa, etc. For mobile games, this feature can be used to build “live” dialogues with the option of adjusting the level of student speech recognition, taking into account the quality of pronunciation.

Modern devices are also ready for the use of augmented reality technologies for the purpose of teaching through games. So, access to certain topics, dialogues, activities can be tied to the geolocation of the device [45]. For example, while waiting for a flight at the airport, a student receives a notification from the application with a proposal to take several thematic levels. Other out-of-game actions on the account can be taken into consideration, since information is already being collected, which is

used to provide the learner with the most interesting content, as well as targeted advertising. The tutorial may also suggest topics of potential interest to the student.

All three types of reactions are aimed at stimulating the same blocks of associates and dissociates. As associates provide varying degrees of analogue transparency, the learning process must go from simple to complex, at the same time there should be constant support regarding the use of words that have been learned by frame-discursive techniques.

The final phase of using analogue learning – a frame-situational one (speech in simple situations as a result of filling the positions of typical communication frames) – may be supplemented by more expensive for practical implementation, but forward-looking effective technologies of Mixed Reality, or Hybrid Reality [46]. The example of such a task can be the imitation of an act of minimum sufficient communication between virtually present participants outside the airport, hospital, store. Sensory-somatic enhancers in these situations will acquire a new quality, which is due to a combination of virtual resources of external projection of the situation and the real somatic reactions of the student. More distant is the perspective of using Extended Reality resources for teaching purposes, or, in other terms, Cross Reality, or Computer-Mediated Reality, which involve the interaction of student localised in the physical chronotope, the cognitive network, student avatar, other participants in the virtual situation. Thus, immersive technologies allow substituting finger interactions of a person with a machine, which is not characteristic of a human nature, by fruitful interactions of a new level. Studies of students’ speech, which focus on the physical world, with tactile and olfactory feedback, have already been undertaken [47].

Our immediate task is to develop incentives for associative and dissociative teaching in the context of immersive virtual reality technology, here one teacher has the possibility to control the acquisition of knowledge by a large number of students or students have the possibility of total self-control. The difference between this methodology and well-known projects will be based on the individual sensory reactions of the student, in contrast to the already used Virtual Encyclopedia – Altair VR [48], where the student is a sensory uninvolved recipient. Ideally, it is even possible to create biological feedback sensors to test students’ knowledge. If the proposed teaching methodology is supplemented by the possibility of organizing virtual student relaxation pauses based on associative and dissociative perception of reality, the project would be completed.

Sensory-somatic inductors appeared to be productive in learning a foreign language in the full spectrum of visual, auditory, tactile, gustatory, and odorative codes and were used by us in exercises of various types.

Exercises engaging reserves of sensory codes are ranked by levels. Exercises of the first and second levels of complexity have potential in learning parameterizable groups of vocabulary.

The first level exercises are based on abstract-symbolic categorization.

- A. Vocabulary rigidly associated with the perception of the world by means of sensory receptors.

The example of an exercise that employs visual code reserves. Find out what the following three phenomena have in common (grass, frog, crocodile – green color; snow, egg, polar bear – white color; sun, wheel, disk – round; ice figure, ice cream, snow-covered mountain – cold, etc.).

The example of an exercise that employs gustatory code reserves. Various objects are placed in three “baskets” according to the sensations they evoke (sweet, sour, bitter, etc.). The objects are taken out with the mouse cursor and named. At the stage of vocabulary presentation, objects can be “taken out” of the baskets, firmly linking the lexeme to the type of sensations, whereas at the training stage, they can be placed back.

- B. Vocabulary related to the conveyance of emotions.

The example of an exercise that employs visual, auditory and tactile codes. A schematic representation of faces with the expression of various emotions (10 main ones, according to C. Izard) is proposed. The correct naming of emotions aloud when hovering the mouse cursor leads to the change of the presented emotion to the emotion of joy. The result is 10 images of smiling faces.

- C. Thematic groups of vocabulary.

The example of an exercise that employs visual and tactile codes. You need to collect words denoting fruit/vegetables/children’s toys in a “basket” by means of the mouse cursor (i.e., a verbal abstract-symbolic categorization is carried out). A properly stocked basket appears as a container with colorful images instead of words.

The example of an exercise that employs visual, auditory, and tactile codes. In a room with various objects, you need to collect the objects of a specific class by means of the mouse cursor and put them in a box (subject abstract-symbolic categorization), naming each object aloud. Correctly named objects turn into words that form a microfield.

Exercises of the second level of complexity are based on natural language categorization and cognitive effects.

- A. Vocabulary rigidly associated with the perception of the world by sensory receptors.

The examples of exercises related to tactile (cold), visual (high), gustatory (tasty) sensations.

The exercise “Why representatives of different ethnic groups do not understand each other”. The “Cold Winter” illustration portrays a Yakut in warm clothing and an African in the rain in light clothing; the “Tall Prickly Pear” illustration – a Masai and a Pygmy, whose heights are very different; the “Very Tasty” illustration – an image of fried insects in Thailand and jellied meat in Ukraine, and so on. The sound response

suggests comparative characteristics of features (“In winter, the average temperature in northern Europe is much.... than in northern Africa, in Europe ...; a Masai is significantly ... than a pygmy, a Masai ...; common food seems to be ..., fried insects seem .... to a Thai person”). If the answer is correct, representatives of different ethnic groups offer their hands to each other.

- B. Vocabulary related to the conveyance of emotions.

The exercise “Why representatives of different ethnic groups do not understand each other” is based on visual, auditory, tactile codes and designed similarly to the previous one based on illustrations. The illustration “Calm Conversation” depicts a typical conversation between an American and a Japanese person; “Joyful meeting” – a Finn and an Italian. Sound responses suggest comparative characteristics of features.

- C. Thematic groups of vocabulary.

Collect from the components, naming them, a sample of an English house (thatched roof, chimneys, white walls, narrow windows, flowers, a cat in a window), a sample of a Swedish house (tiled roof, chimneys, wooden house, painted red/black/yellow colors, glass wall, flagpole and dog in the yard). The correct naming of the house components leads to the fact that the house appears in color, in case of incorrect naming – the house falls apart.

Tasks of the third level of difficulty are based on an analogy with children’s games that combine speaking and demonstration of actions, which is applicable in online learning. It is enough to record a series of videos with the actions of anthropomorphic visually attractive characters who would perform elementary actions, for example, movements (take – give), actions (stand – sit), while naming them aloud – using the audio channel (I dance, I draw). It is advisable to ask language learners also to perform the described actions – it is possible in the process of self-study. It is also possible to create an educational application in the genre of interactive cinema. The player becomes a participant in the process – the course of the plot depends on their decisions and phrases named or selected by the cursor (!). The plot turns can be elementary (Stimulus “Cold” – reaction “Put on a coat”, “Rain” – “Take an umbrella”) and more complex (“Shall we have dinner together? – Yes! – Where would you like to go – there is a choice”). The introduction of the student into such a “film” or comic strip is an effective element of involvement. An easy reading of the emotions, feelings of the characters as a result of the actions of the player works for understanding, the importance of decisions – for activating a sense of responsibility, an interesting story makes a person spend more time playing a game and learning.

The effectiveness of these exercises is due to the presence of sensory inductors that reinforce gnostic knowledge with perceptual sensations.

## 6 Conclusions

The modern world, determined by the processes of globalisation, virtualisation, intensification of the information flow and, while remaining multilingually and ethnoculturally marked, requires changing educational trends in the field of learning a foreign language in favor of self-study and use of virtual and augmented reality technologies, but the main thing is to turn the learning process into a fascinating and effective one by introducing the learner into a flow state. The state of flow and the full involvement in the learning process with dominants of joyful anticipation, pleasure, full dedication and subconscious readiness for the rapid assimilation of new material is the result of the use of immersive (immersive) techniques and can be caused when mastering foreign languages due to computer learning or self-learning technologies. Our study has shown that it is promising to use the ontogenetically formed biological resource of a person, sensory-somatic enhancers, for modern teaching of foreign languages. Such enhancers take an important place among motivators for learning today, but according to the results of the students' survey, they can and should take a worthy place among enhancers for learning. In traditional methods of teaching foreign languages, sensory-somatic enhancers have found application only in the methods of suggestopedia in a broad sense. At the same time, their learning potential, as we have shown in our study, is clearly manifested in ethnic cross-generational children's games, systematically aimed at harmonizing the activity of the two hemispheres of the human brain, during which entertainment often gives way to effective learning. Sensory-somatic enhancers were used to develop the mnemonic capacities of the people non-systemically, but gradually.

In the digital era, sensory-somatic enhancers were employed for foreign language learning in the NCNLP games. The use of sensory induction significantly affected the quality of the operator's work with the brain. The lively response of the student audience to the proposed sets of exercises based on sensory-somatic stimulation and the possibility of quick identification of the student's belonging to the group of dominant sensory perception, confirmed by a questionnaire, allowed us to create and offer for experimental testing educational complexes based on sensory induction. The proposed educational complexes of three levels of complexity, the samples of which have been introduced into the work, are based on the use of sensory enhancers in the study of parametrized (based on abstract and symbolic and natural-language systematization) vocabulary and on cognitive effects, as well as on the possibilities of reinforcing the student's mediated dialogue and computer programs (in the course of training through videos with a stochastic plot).

Modern teaching of foreign languages should be based on ontogenetically formed human biological resource – sensory-somatic enhancers. Our research proves that sensory-somatic enhancers are historically proven effective means of teaching, systematically aimed at harmonizing the activities of the two hemispheres of the human brain. Sensory-somatic enhancers were used to develop

mnemonic capabilities of a person in a non-systematic but regular way.

Our proposed method of analogue teaching, combined with the methods of immersive technologies, promises to significantly accelerate and improve the learning process. The use of these methods is ergonomic at the preparatory stage (self-identification of students by representative systems), at the stage of non-situational language learning using augmented reality technologies (computer programs for visual, auditory, and kinesthetic learners). It is promising at the stage of frame-situational learning with involvement of mixed reality technologies. Other immersive technologies will inevitably be focused on sensory-somatic enhancers over time.

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# Flipping the Aviation English class for distant learning: experience from the field

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**Abstract.** This study is aimed to verify experimentally the efficiency of the flipped classroom approach using in the process of online teaching Aviation English at National Aviation University. It was conducted from September till December 2020. The research included two groups of students of the second year of study speciality: 272 'Aviation Transport'. The experiment employed mixed-method research in convergent design. In the context of the experiment testing to determine students' level of professional language communicative competence in English were conducted in September and December 2020 at the beginning and the end of the first term of the academic year 2020-2021. Testing revealed that students from the experimental group have better results in professional language competence development. A survey was conducted in the experimental group aimed to reveal students' impression from the flipped classroom approach using in distant learning. According to the results of the experiment, it was stated that students have mainly positive attitude to the experiment Advantages and disadvantages of the approach are identified. The conclusion was made that in the context of distance learning, the flipped lessons approach is acceptable for mastering the Aviation English course.

## 1 Introduction

### 1.1 The problem statement

Since early spring of 2019, the epidemiological situation in our country as well as in the whole world made traditional forms of education impossible. The disturbance caused by the COVID-19 pandemic is qualified by the United Nations Organization as the largest disruption of the education systems in history, affecting nearly 1,6 billion of learners in more than 190 countries and all continents [1]. The created conditions have exacerbated the need for distant on-line education at various educational levels in Ukraine, including classes of Aviation English at National Aviation University.

New language proficiency requirements implemented by the International Civil Aviation Organization (ICAO, 2004) were followed by several theoretical and practical measures to improve the Aviation English teaching process [2, 3]. To prepare students for foreign language communication in their future professional field, the modern educational process at the university should take into account both, the trends in the development of science and technology and the requirements of society for the quality of educational services.

It is widely known, that foreign language acquisition requires time, practice and patience. For the last decades, learning strategies as a way to make language learning

more effective have become a field of research for many scholars [4–6]. Application in the educational process constructivist approach in which the individual is in the centre of the educational process makes the process of learning easier and more effective [7]. Purposeful use of information and communication technologies, as well as electronic means in the educational process, is one of the most effective ways to accomplish this task. Teachers aim to present a rich learning experience to the students and to create a more engaging and motivating classroom atmosphere [8, p. 29].

*Flipping the classroom* is an exciting topic in educational research of the last two decades [9–11]. But there is a lack of scholars' consensus on what exactly the 'Flipped' or 'Inverted Classroom' is, there is no single model for it and there is a limited amount of research on its effectiveness. The **objective** of our study is to experimentally verify the efficiency of the flipped classroom approach use in the process of online teaching Aviation English.

### 1.2 Literature review

Scholars are conceptualizing this educational phenomenon in different ways. 'It involves blending learning – a combination of face-to-face interaction in the classroom with distance learning' believe **Santikarn & Wichadee** [12]. This point of view is mainly supported and developed by **Arnold-Garza** who stated 'This approach is a type of hybrid or blended learning as well as problem-based learn-

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ing, using active learning techniques and new technologies [13]. These ideas are prominently reinforced in this way ‘This notion draws on such concepts as active learning, student engagement, hybrid course design, and course podcasting’ [14]. These definitions are some extend confusing, but most scholars seem to agree that fundamental principles of the flipped philosophy and the main value of this approach are active learning and student-centred learning approaches that can lead to enhanced student engagement, motivation, and learning [15]. Let us review some of these definitions and try to gain insights into what the notion of ‘flipping the classroom’ means and consists of.

Now exist a large literature about this notion. **Oxford** dictionary defines *flipped classroom* as a method of teaching in which students study new material at home, for example with videos over the internet, and then discuss and practice it with teachers in class, instead of the usual method where teachers present new material in school and students practice at home [16].

Though a basic form of this approach was used for many years by instructors of humanity-based disciplines assigning text reading in advance of a class to conduct further text analysis in the class [17], chemistry teachers **Jon Bergmann & Aaron Sams**, who began using recorded lectures in 2006, are recognized as flipped classroom developers. They define the flipping approach as ‘flipping the attention away from the teacher and toward the learner... and leveraging educational tools to enhance the learning environment [15]. According to these scholars, in the educational process, the inversion is observed ‘which is traditionally done in class now done at home, and that which is traditionally done as homework is now completed in class’ ([18], as cited in [8, p. 29]).

**Bishop & Verleger** defined the flipped classroom as ‘an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom’ [19]. Supporting this idea, but determining it as an approach **Brame** indicates, that ‘flipping the classroom involves students in knowledge acquisition of course material before a class section, typically through assigned reading or lecture videos, leaving class time for the integration of knowledge through the application, analysis or synthesis-based activities’ [20]. Specialists from non-profit membership Association **EDUCAUSE** (dedicated to instructional technology in higher education) define the flipped classroom as ‘A pedagogical model in which the typical lecture and homework elements of a course are reversed’. The main characteristics are given in this way ‘Short video lectures are viewed by students at home before the class session’. Such lectures are either created by the instructor and posted online or selected from an online repository and are often seen as the key ingredient in the flipped approach [14]. **Lage & Platt** explain the essence of the approach of the flipped (inverted) classroom thoroughly: ‘The events that have traditionally taken place *inside* the classroom now take place *outside* the classroom and vice versa. The researchers consider it the most acceptable for solving the problem of inconsistency of edu-

cational styles possessing the students and the instructors and point out the opportunities of interaction as the main strength of the approach. Besides, they emphasize that this approach implementation makes it possible for faculty-students to clear up any confusion immediately, and the instructors can monitor students’ performance and comprehension [21].

Many scholars [8, 13, 17] stress the idea about an important role that modern technologies play in approach development. Creating educational video instructors can provide the lecture content and implement the flip taken from online resources. Among them are Khan Academy, Coursera, TED talks and even YouTube, providing access to recorded lectures, instructional videos, and other interactive elements [13] But, as **Basal** claims, that ‘an *educational video or video lecture* is different from showing video in the classroom’. That is why video-content is integrated through the use of lecture capture technology such as Tegrity, Echo 360, Panopto, or iPad apps like Educreations and Doceri in ‘concert with lecture slides for delivering course concepts’ [17]. Subsequently, it is a modern technology used to produce, edit, and distribute learning information, which brings an innovative perspective to traditional lectures [8]. A successful flipped class involves more than just recording didactic content and sending it to students before a lesson. Classroom time is used for engaging in activities, discussing concepts, clarifying hard-to-understand information, and investigating questions related to content [8, p. 29]. The particular value of flipped classroom lies in the existing possibility for students to stop the video and rewind it if necessary, for better understanding. Furthermore, prerecorded videos must be inseparably combined with in-class activities. Otherwise, class time prove ineffective and time-consuming [8, p. 33]. Among other advantages, there is one more positive aspect of the approach. It allows instructors easy and quick detecting errors in students understanding of the content and evaluates their performing [15].

Now exist a large literature about different models flipped or inverted classroom and various approaches to implement this technology suggested by researches and practitioners [22]. No single accepted model or approach has been established. The term ‘flipped’ or ‘inverted classroom’ or simply ‘flip’ is commonly used for any lesson with pre-recorded videos or as a variant new information can be given in any other form (slides, audio, podcasts, narrated presentations, videocasts with animation, screen captures, printed texts) [13].

The advantages of the approach are indicated analyzed in the literature. ‘The flipped classroom helps students learn to correct misconceptions and organize their new knowledge such that it is more accessible for future use. The immediate feedback also helps students recognize and think about their own growing understanding’ [20]. Further analysis allows noting the following. Flipping the classroom represents an approach to teaching and learning that focuses on student involvement [17] and increases student engagement [22]. This shifts instructions to a learner-centred model of learning and autonomy [23]. The approach offers flexible instructional time and creates a dy-

dynamic and interactive learning engagement [22], it brings together individual-based education idea of constructivism and the technology [7]. **Basal** suggests dividing a flipped classroom into learning environments: *outside* and *inside* the classroom, which must be integrated into the model to be effective. The researcher suggests defining some steps. The *first step* for teachers is planning in detail what will happen in each environment. The *second* is selecting a variety of appropriate activities that address the needs of all learners according to students' learning styles. The *third* is to determine how to integrate tasks and activities in both environments. The *fourth* is to use a learning management system, connecting the outside and inside parts like a bridge and presenting all activities in an organized way [8, p. 33].

So, the above stated allows us to note, that a *flipped classroom* or *inverted learning* is an approach to teaching and learning with a special instructional strategy. The term is used when students gain first exposure to new information on the educational topic outside of class, they have presented it through pre-recorded lecture videos or other media and/or literature reading, receive instructions on content clarifications through homework, while in-class time is devoted to discussions, exercises, projects and supplementary explanations. This approach creates a suitable learning environment for learning foreign languages at different educational levels including the university level. Researchers and practitioners [7, 8, 12, 22–24] actively discuss various aspects of flipped classroom implementation into ELT (English Language Teaching), its advantages and disadvantages regarding students' and instructors' perceptions. The authors make the general conclusion about the positive influence of flipping the classroom approach on students' EFL learning process. Our special interest was aroused by Chinese researcher **Zhang** who analyzed Flipped Classroom approach application and Teaching Process Reengineering via Smart learning in Aviation college (higher vocational school) preparing flight attendants. The research showed that the re-engineered teaching process, which was focused on learner-centred instruction, could effectively enhance student engagement both in and out of class instruction [25].

## 2 The study

Forced to stay at home and aiming to enhance students' learning achievements we came to the idea to reverse the traditional model of a classroom and focus class time on students' understanding and language skills formation while in pre-class time students would be sent pre-recorded educational information in a different format for self-mastery. A clear requirement was set: pre-recorded video information has to be integrated with in-class activities alongside other integrated elements of technology. In the work, we identified the steps.

Step 1. A detailed plan of work for in-class and out-of-class activities according to the official university curriculum was made.

Step 2. Available resources were estimated, identified sources for obtaining new materials and ways to create their materials.

Step 3. A variety of appropriate activities that address the needs of all students was selected.

Step 4. A learning management system, connecting the outside and inside class time and including students' knowledge and skills assessment system was chosen.

Step 5. Research questions were determined.

Based on the above considerations, the current study aimed to find out answers to three research question:

**Research question 1.** To explore the concept of the flipped classroom in the process of ESP (Aviation English) in a technical university in distant learning.

**Research question 2.** To examine students' performance throughout a semester of distant learning in a traditional and flipped environment.

**Research question 3.** To identify students' impressions of Aviation English Course distant learning at National Aviation University.

**The hypothesis** of the current study: The introduction of the flipped classroom approach into the language ESP course (Aviation English) distant learning can help students to improve their performance.

In our work, we paid special attention to sending students pre-recorded educational information for self-mastery in good time. These materials were sent to students in a different format (slides, audio texts, podcasts, video narrated presentations, videocasts with animation, printed texts). In-class time was used for active and interactive methods (real-time discussion, dialogues, presentations, quizzes and so on).

### 2.1 Participants

The participants of our study were 41 students of the second year of study at the National Aviation University speciality: 272 'Aviation Transport'. At the time of research (the third semester of 2020–2021), English for Specific Purposes (ESP) lessons were part of their official university curriculum. According to the curriculum, two-hour classes were held distantly once a week. Out of 41 participants, 17 were females and 24 were males who were ranged from 17 to 19 years. Although the students were registered in two different groups (control and experimental) matched by English language proficiency level the research was conducted by the same teacher who followed the same procedure and used the same materials for questioning and evaluation students' achievements in learning. In the process of the experiment, there were used the same educational materials for developing practical language skills in various types of speech activity in professional and educational spheres as well as attention was paid to the improvement of already acquired vocabulary and grammar skills. It is worthy to stress that different

approaches to learning students in control and experimental groups were used. Both groups were taught using the same educational course and teaching materials through distant learning. But students of the experimental group were taught using flipped lessons approach while teaching students of the control group a traditional educational approach was used.

Students' level of language competence was assessed in the control and experimental groups by the course teacher and her colleague at the beginning and the end of the first term of the academic year 2020–2021. According to the results of the test, the conclusion was made that students' level of language competence in both groups was miscellaneous. It was found out that at the beginning of the experiment 4 students in the control group and 3 students in the experimental group had a Pre-intermediate level of language competence, besides 1 student in the control group and 2 in the experimental had a rather low level of language competence defined as Elementary, which is not enough to master the course. They were suggested special training in grammar and language practice. Teachers actions: posted online short video lectures for students to view at home before the next class session to free-up the class time for active learning and problem-solving activities. We used previously recorded videos and added interactive elements. The total length of the videos was limited from 5 to 20 minutes. Educational videos were sent to students via the system of corporate mail of National Aviation University at least three days before the class. Online classes took place through the system of corporate classroom.

## 2.2 Methods

During the experiment preparation, we used the ideas expressed by the scientists, whose papers we analyzed in the chapter Literature review in our interpretation. Pre-recorded video information was integrated with in-class activities alongside other integrated elements of technology. Learning lectures were put under the control of the students, so they could be viewed more than once, practically as many times as necessary, while class time was devoted to the application of concepts learned through the lecture. A pre-class quiz on the lecture material was used systematically. During the study, students were suggested active and interactive learning exercises, performed language quizzes/tests, at the end of the semester they presented a project on one of the mastered topics.

To use mixed-method research in convergent design [26, pp. 3–6] we collected quantitative (language performance results) and qualitative (questionnaire answers) datasets. Next, we merged the results of the two data analyses to compare and validate one set of results with the other. Then we integrated information for better understanding the problem of using flipped classroom in ESP class (Aviation English) through online (distant) learning.

## 2.3 Results and discussion

The data analysis collected during the experiment suggests that the results of the testing at the beginning of the term

showed nearly the same level of language competence in the experimental and control groups. The tests were assessed using the ECTS grading scale which split into five segments: A – 100–90; B – 89–82; C – 81–75; D – 74–67; E – 66–60. According to the results, before the experiment, the percentage of students in **the experimental group** with a sufficient level of language competence before the experiment put 76,2%. Consequently, 38,1% of students of the experimental group had A-marks. After the experiment, the percentage of students with A-marks increased to 52,4%. The difference reached 14,3%. The percentage of students with B marks equalled 38,1% before, and 42,9% after the experiment, the decrease constituting 4,8%. Consequently, the percentage of students in the experimental group with C and D marks, which indicated an insufficient level of professional language competence development, decreased sufficiently C from 14,3% to 4,8% with a difference of – 9,5%, and D from 9,5% to 0%. The total decrease of students with a low level of language competence is 19,0%. While the total increase in students' success is 19,1%. In the **control group**, the sufficient level before the experiment put 75%, which was almost equal to the score in the experimental group (76,1%). But, according to the results of the experiment, the differences in the levels of students' language competence positive changes are not so significant – only 5% (75% vs 80%). The decrease in the number of students with an insufficient level of language competence: C – 20% before the experiment and 20% after the experiment, was less significant compared to the experimental group. Besides, students with a mark D score of 5% before vs 0% after the experiment. The results of the testing are summarized in table 1. Students from the experimental group have better results in professional language competence development (experimental +19,1% vs control + 5%).

**Research question 2.** Students' performance before and after the experiment proves that the flipped classroom approach application had a positive effect on students' level of communicative competence.

To identify students' impressions of Aviation English Course distant learning in National Aviation University students of the experimental group were suggested to answer anonymously the questionnaire at the end of the first term (qualitative data). A Likert scale containing 5 ready answers (strongly agree – agree – neutral – disagree – strongly disagree) was used to measure students' motivation for research question 3. The questionnaire was composed of 7 questions with possible responses which were scored using a rating scale of 1 to 5. (5 corresponded to 'strongly agree' and 1 – 'strongly disagree'). The survey also included **open-ended questions**. They are presented in table 2).

Participating students were asked to discuss their experience with the flipped classroom in which they were engaged. Specifically, they were asked to explain their attitude to the approach. Students Feedback on the open-ended questions about Flipped classroom approach is presented here.

**Question 1.** What is your attitude to education from home?



**Table 1.** Results of the testing the level of language competence before and after the experiment, quantitative data

Marks	Control					Experimental				
	Before the experiment		After the experiment		Difference	Before the experiment		After the experiment		Difference
	Students	%	Students	%	%	Students	%	Students	%	
A	9	45	10	50	5	8	38,1	11	52,4	14,3
B	6	30	6	30	-	8	38.1	9	42,9	4,8
C	4	20	4	20	-	3	14,3	1	4,8	-9,5
D	1	5	0	-	-5	2	9,5	0	-	-9,5
Total	20	100	20	100		21	100	21	100	

**Table 2.** Students' impressions of Aviation English Course distant learning

No	Questions	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
1	I like the pre-class exposure of information (reading the coursebook, watching video lectures, podcasts or screencasts or listening to audio information). It contributed to learning the language connected with future professional communicative activity.	4	14	2	1	0
2	The incentive to come to class prepared was useful because we had to complete an online quiz or take part in the debate/discussion associated with the assignment. It helped me to understand and master the learning content better.	7	9	5	0	0
3	Pre-class exposure of information (reading the coursebook, video lectures, podcasts or screencasts or listening to audio information) encouraged me to discuss the course content with my peers.	2	2	11	4	2
4	I'm sure that pre-class exposure of information (reading the coursebook, video lectures, podcasts or screencasts or listening to audio information) helped me to focus on the most important aspects of the course.	3	14	2	1	0
5	Pre-class exposure and asynchronously delivery of information made it possible for me to study in a convenient place and time and I could repeat it as many times as needed at my own pace.	15	3	3	0	0
6	Online short quizzes, discussions and debates served as informal checks of content understanding. I was actively engaged with pre-class video lectures, printed and audio information sent through email.	12	5	2	2	0
7	Active engagement in mastering pre-class information and in in- class activities participation helped me to prepare the project at the end of the semester and successfully pass the midterm exam.	10	7	2	1	1
Total		53	53	27	9	3

Positive – 16.

Negative – 3.

Neutral – 2.

Students explained negative answers: 'It was cool at the beginning, but now ... it is not, especially when you have technical problems with computer or telephone because it isn't new or internet is not good enough. I miss my friends and instructors', 'Constant communication through the screen... I find it difficult'.

**Question 2.** Do you consider flipping the classroom the best approach to learning in a pandemic situation?

Positive – 15.

Negative – 1.

Neutral – 5.

The common answers: 'It is good, but I can't call it the best'. 'I like the approach. But I feel it is a little time consuming because I have to watch the video or listen to

the audio assignment and then we do different activities in class. It's like double the amount'.

**Question 3.** Would you like to be taught ESP traditionally or using flipped classroom in future?

Positive - 15.

Negative - 3.

Neutral -3.

The most common answer: 'I like the approach very much, previewed lectures were interesting, they were authentic and connected with my future profession, they widened my world view. I had plenty of time to watch them'. Among the answers, there are three answers with the meaning 'I would prefer to mix the different approaches'.

**Question 4.** What recommendations would you give to other teachers using the flipped classroom approach for teaching ESP online?

Left without answers.

**Question 5.** Do you have any other comments or questions? Left without answers.

**Research question 3.** To identify students' impressions of Aviation English Course distant learning at National Aviation University. The data collected during the experiment are presented in table 2, it reveals that students positively evaluated the application of the approach 'Strongly agree' and 'Agree' both received 53 balls. The highest scores of students' answers were given to Q 1 and Q 5 - 'Strongly agree' and 'Agree' - 18 balls. It indicates increasing students' motivation to study through self-mastery of content at home. Besides we can comment on it in this way: students' like taking responsibility for their study and appreciate the way to individualize the way of learning. The possibility to check the content understanding (Q 6) together with the realized opportunity to receive a high mark for the work done (Q 7) as well as opportunities to focus on the most important aspects of the course (Q 4) also were highly approved by the students and received 17 balls. High enough students evaluated the incentive to come to class prepared (Q 2). This question scored 16 balls. The less score received Q 3, which indicates a reluctance to share impressions about learning for some reason. The total of positive answers is 106, while the total of negative answers is 12 and neutral 27. Students answers to open-ended questions allow us to conclude that the stressful situation affected all aspects of our life, it also displayed in the educational sphere. Students are mainly positive about the flipped classroom approach. They especially appreciate asynchronously delivering or pre-class exposure of information which flipped classroom is characterized.

**Research question 1.** To explore the concept of the flipped classroom in the process of ESP in technical university distant learning. The results of the analyses allow us to state that the concept 'flipped classroom in the process of distant ESP learning in technical university' provides the following. Students gain first exposure to new information on the educational topic outside of class, they have presented it through pre-recorded lecture videos or other media and/or literature reading, receive instructions on content clarifications through homework, while

in-class time is devoted to language practice, discussions, exercises, projects and supplementary explanations. The main features of the approach are: frees time for classroom work; creates conditions for individualization of professional language learning; puts more responsibility for learning on the students; promotes the development of language and speech skills; allows to provide a professional orientation of educational texts and work on them in four types of speech activity; teachers function mainly as advisors, encouraging students in their work.

Results of the experiment revealed a positive effect of the approach application. Students of the flipped environment scored significantly higher on language tests compared to the students of traditional approach distant learning. However, this approach is teacher's time-consuming and not suitable for all students due to some constraints. Several students indicated problems existing in learning caused by technical problems with the computers, internet and electricity (obsolete equipment caused connection failure especially in rural areas). Some students indicated a preference for the in-class lecture. So, it should not be the only method used under normal conditions.

### 3 Conclusions

Extreme transition to distance learning has created problems due to insufficient technical equipment, teachers and students' unpreparedness to work in new conditions caused by lack of training. At the same time, the new learning format has provided a wide range of opportunities and prospects for change and improvement. Technologically enriched learning environments in modern university in the appropriate format offered students from experimental group better learning opportunities. Correctly selected course materials, meeting the educational goals ensured a positive learning income objective. It is proved by the results of the experiment. Students from the experimental group have better results in professional language competence development than students from the control group (experimental +19,1% vs control +5%).

Results of the questionnaire reveal that students positively evaluated the application of the approach (positive answers are 106, while the total of negative increasing students' motivation to study through self-mastery of content at home; taking responsibility for their answers is 12 and neutral - 27). Opportunities offered by approach (asynchronously delivering of information; study and appreciate the way to individualize the way of learning; possibility to check the content understanding; realized opportunity to receive a high mark for the work done; focusing on the most important aspects of the course) are approved by the students.

As a result of the experiment, we concluded that for the successful implementation of distance learning, the instructor of a technical educational institution has to be ready to use active and interactive teaching methods; to promote the formation of students' learning style to work online; to master the capabilities of the online learning platform and the necessary software. To manage the course effectively, the instructor should develop students'

skills to stick to deadlines use tools for students' encouragement to assess students' paper on time. We have to admit some downsides of the approach. The model of flipping the class should be explained to students beforehand, nevertheless, some of them can feel uncomfortable and lose much time and efforts. Besides, this approach is the instructor's time and efforts consuming, especially the process of learning information searching, adopting and lectures recording, furthermore the instructor must be skilled enough.

We identify the flipped classroom approach as a highly successful educational practice, giving opportunities to personalize instruction and allows students to be more responsible for their learning. Students can master language skills formation at their own pace, which gives them opportunities to become comfortable with the learning material. In the context of distance learning, the flipped lessons approach is acceptable for mastering the Aviation English course. We believe that foreign colleagues' experience in this approach application deserves a comprehensive study.

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# Implementation of MOOC platforms into teaching English to IT specialists

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**Abstract.** The paper deals with the issue of application possibilities of MOOC platforms in IT specialist training. It is emphasized that this problem is urgent due to the coronavirus pandemic which caused reconsideration of educational approaches, means and tools. In the study the analysis of the most demanded massive open online course platforms in terms of IT specialist training is presented. Challenges of MOOCs for teaching and learning foreign languages are highlighted. Profession-related, soft skill mastering and English learning courses have been scrutinized in terms of their content and user-friendliness by teachers and students of two universities. Design, layout, topics, communities, documentation, and application availability have been evaluated and ranked. Three online English courses of similar purpose on Coursera, FutureLearn and Prometheus have been compared and ranked with the aim to advise the most efficient one to senior undergraduates striving to be employed in Ukraine and abroad in the multicultural IT environment.

## 1 Introduction

The coronavirus pandemic has drastically changed the way of living, education and entertainment all over the world [1–8]. Due to national lockdowns and imposition of quarantine educational establishments of different levels had to be closed at the beginning of 2020, so governments, local administrations, educators and students had to find appropriate ways and tools to continue and even to complete education. Numerous attempts to continue learning and teaching have been made: new educational online courses have been developed, existing online courses have been rearranged and updated, new practices of teaching and learning have been introduced, TV-programs on different subjects have been created and broadcast on national TV channels, various websites, pages in social networks for teacher and student support have been initiated.

Simultaneously, enrollments at massive open online courses boosted. The statistics [9] shows that registrations at Coursera and Udemy in March-April 2020 were correspondingly 640% and 400% higher than during the same period in 2019. These figures can be explained by presentation of free courses to university partners and consequent possible participation in courses by university students.

## 2 Analysis of MOOC implementation in higher education

Massive open online courses (MOOCs) [10–12] have had their history since the beginning of the 21st century which comprises quite opposite periods in their existence: from

the explosive early growth and declaration of 2012 as the “Year of the MOOC” [9] to almost passing into oblivion and even the “death” [13].

The term MOOC was coined by Dave Cormier in 2008. George Siemens who was an inspirer of MOOC introduction into education defined it as “an online course with the option of free and open registration, a publicly shared curriculum, and open-ended outcomes” [14]. According to Wikipedia [15] (last accessed 10 November 2020, the definition is regularly updated) “a massive open online course is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials, such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums or social media discussions to support community interactions among students, professors, and teaching assistants, as well as immediate feedback to quick quizzes and assignments”.

M. Perifanou [16] gives the following explanation of the acronym MOOC, stating that MOOC stands for Massive Open Online Courses, where the term “massive” refers to the large number of participants taking part in the course; the term “open” means a course without any charges or any definite conditions to join the course; the term “online” indicates that courses are available on the web with the free content.

According to the MOOC-BOOK, an open resource for business, higher education institutions and learners, in order to make use of MOOCs [17] these courses have made it possible to study at any suitable time, in any place, with lower costs or free, in a flexible mode. In addition, participants can interact with different people, join new groups of people with joint interests, generate new ideas, and originate innovative projects in different fields.

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N. Alhazzani [18] emphasizes that MOOCs are based on the four major principles of Siemens connectivism:

- compilation (resources are added to the webpage during the course in contrast to traditional courses where resources are arranged at the beginning),
- modification (users collect, sort and manipulate materials in their own manner),
- re-employment (users study materials and express their opinions on the web in different ways),
- dissemination of distinctive ideas (users exchange their views with other users).

N. Alhazzani insists that according to his research MOOCs have direct impact on higher education in terms of improving learning outcomes, developing student skills, and fostering effective communication with values.

S. Gallagher and J. Palmer in their article [19] state that the last decade has been a time of education “alternatives, including massively open online courses, industry-driven certification programs, and coding bootcamps”, emphasizing that higher education has moved much slower “to a more digitally-driven, outcomes-focused business model”.

Having studied participation in MOOCs J. Reich and J. Rui Pérez-Valiente [20] state that the majority of participants do not return after the first year of their study, MOOC participants come from the most prosperous countries, and the course completion rate has been low. Diane Peters having reviewed information on MOOCs for ten years of their existence gives more exact figures of MOOC completion rates asserting that they are equal to 5% [21].

S. Lohr in review [22] brings to mind the fact that at the time of their introduction MOOCs were “tech-fueled insurgents destined to disrupt the antiquated ways of traditional higher education”. He presents some MOOC statistics on completion of the courses and stresses that 10% of students completed free courses, 40-90% of participants completed paid courses. The completion rates, certain drawbacks of MOOCs, as the author notes, caused a punch line “Remember the MOOCs?” among academics.

The situation with MOOCs dramatically changed in spring 2020 when these courses regained their popularity. Statistical reports confirm that the number of new users in the most popular MOOCs increased by hundreds percent. In April 2020 Coursera, edX, and FutureLearn enrolled as many new students as in the whole of 2019. About 25-30% of total registered users on MOOCs came after the pandemic [23]. The analysis of five most widely used platforms is presented in table 1.

Much research has been done on the use of MOOCs before and after declaration of COVID-19 a worldwide pandemic. T. Chen et al. [24] have made an attempt to study the online education platforms before and after the outbreak of COVID-19 in terms of online user experience. The research found that before the outbreak of the pandemic the main concerns were “the access speed, reliability, and timeliness of video information transmission of the platform”. The outbreak of the pandemic changed these concerns shifting to “course management, communication and interaction, learning and technical support services of

the platform” with the user experience as the most significant one. Researchers have proposed to refine four main aspects of online education platforms: improving support service, improving the convenience of interactive communication, optimizing the ease of use, and enriching platform resources.

L. Ma et al. [25] studying the mixed teaching mode in the pandemic situation reveal the following drawbacks of MOOCs:

- 1) lack of direct communication between teachers and students;
- 2) low learning efficiency due to visual fatigue because of constant work with electronic devices and insufficient teacher supervision;
- 3) limitations of the learning environment.

### 3 Challenges of MOOCs for teaching and learning foreign languages

Facing challenges of 2020 prominent educational establishments have made significant efforts to ensure equal educational opportunities for all the learners worldwide. MOOCs which earlier were considered to be longlife learning instruments for filling gaps in knowledge upgrading and reskilling, became paramount studying venues for learning various disciplines, including foreign languages [26]. Moreover, MOOCs allow to follow the basic principles of foreign language teaching: deduction, student orientation, purposefulness and the communicative content of lessons [27].

I. Duru et al. [28] classify studies on investigating behaviours of second language learners within MOOCs as:

1. Participant engagement in a MOOC which is delivered in a language other than English.
2. English language learners engagement in a MOOC which is delivered in English.
3. English as a second language learners engagement in a language MOOC which is authored for learning the English language.
4. English as a second language learners engagement in a MOOC which is delivered in English.

Studying the issue of workplace training, particularly learning English for Occupational Purposes in MOOCs, K. Rafiq et al. [29] give the following benefits of MOOCs both for employers and employees:

- self-paced learning environment which is crucially important for working people,
- lifelong learning opportunities, which foster acquisition of new knowledge and skills necessary for the workplace and encourage gaining online-based learning experience,
- professional development by ensuring active participation of learners in the course acquiring skills vital for organisations,

**Table 1.** Factfile of MOOC platforms (retrieved from open sources)

MOOC	Number of students	Number of courses	Application	Registration	Certificate	Languages
EdX	33 mln	3,000	Android, iOS	Obligatory	+ Free/paid	English
Coursera	60 mln	3,900	Android, iOS	Obligatory	+ paid	Multilanguage
FutureLearn	10 mln	1,600	-	Obligatory	+ Free/paid	English
Udemy	35 mln	130,000	Android, iOS	Obligatory	+ Free/paid	Multilanguage
Openlearning	2.5 mln	3,600	Android, iOS	Obligatory	+ Free/paid	English

- free training which gives the chance to study without any payments making the education cost-effective and time-wise.

Definitely, MOOCs have certain drawbacks for students and teachers. One of the most significant disadvantages is the lack of personalization. A. A. Qaffas et al. [30] studying optimal personalization strategy in MOOCs state that learners are unique, have their own potential and study in their own manner which can be different from other students. Therefore, personalization of MOOCs is the strategic task of course developers.

One of the most challenging drawbacks is the absence of real-time connection of teachers and students. R. Furtado [31] insists that “MOOCs are an example of asynchronous learning”, therefore there is no simultaneous interaction between students and teachers.

P. Raine states that not every participant need is satisfied by the MOOCs as DuoLingo and Busuu aimed at studying foreign languages, since students may need to practice particular aspects of foreign languages, they also may require the language content specially made for a particular student. The researcher also considers a MOOC not only as a learning tool and resource, but also as a promising “avenue for experimentation and research” [32].

M. Israel [33] reveals that integrating MOOCs into traditional classroom settings requires high motivation and additional time for instructors to use MOOCs in the educational process which increases the workload. D. Bruff et al. insist that this challenge is caused by the necessity of complying with coupling and cohesion where coupling means the “extent of dependency between online and in-class components” and “cohesion refers to the relatedness of the course content overall” [34].

According to the research of polytechnic lecturer acceptance of using massive open online courses for teaching English as a second language by N. Rubaai and H. HashimInter [35] there are five challenges faced by course participants:

- 1) absence of Internet connection or poor Internet connection which can cause demotivation of students to participate in the course;
- 2) the necessity to spend additional time while learning in MOOCs;
- 3) changes in student attitudes;
- 4) the lack of application knowledge resulting in difficulties in dealing with technologies;

- 5) instability of MOOCs in terms of student progress monitoring.

M. A. Perifanou, A. A. Economides [36] propose a list/framework of the core course elements that a MOOC for language learning should have. These core elements are:

- a) content (authentic educational resources; use of multimedia/technology; variety of activities that promote all basic language skills and support cultural awareness);
- b) pedagogy (communication, collaboration, collective intelligence; autonomy, engagement-motivation; playful/game based learning, number of instructors);
- c) assessment (ongoing assessment/ scaffolding, final assessment; evidence-based improvement, feedback);
- d) community (social community building);
- e) technical infrastructure (maximum number of participants, platform performance, security, usability);
- f) financial issues (profit, charges for course or certification/ accreditation).

The list can be used for designing and evaluating the MOOC environment.

#### 4 Practical aspects of implementation of MOOC platforms into IT specialist training

The Covid-19 pandemic has changed the attitude of all educational process agents towards distance learning: the students turned to it in order to become certified specialists in their professional and related spheres and the instructors implemented online learning resources into teaching their subjects in order to diversify instructional materials through involving students into online activities, to add cultural and linguistic aspects into undergraduate education, to enhance student motivation to learn. One of the most beneficial features of online courses (alongside with their completion and being awarded a certificate) is the possibility to select the themes and to realize one’s own need in improving the specific skill or in filling a gap in one’s knowledge through partial studying the course. Furthermore, since the most advanced online platforms worldwide are Coursera, FutureLearn and Udemy, most courses displayed on them are in English, which is a powerful incentive and concurrently means for improving one’s English language skills. In addition, personal

MOOC verified certificates of achievement issued by the educational establishment that provided the online course give students the opportunity to receive university transfer credit at Ukrainian universities. The grounds for the transfer are corresponding university regulations and procedures.

The authors of this study have chosen namely the students majoring in IT as MOOC explorers during the Covid pandemic due to their strong motivation for learning and awareness of three aspects reflecting the successful employment terms:

- 1) a globalization trend within the labour markets of the countries with the most progressively functioning ICT companies;
- 2) inevitable superiority of confirmed various skills and experience over university certificates of degree in the view of HR managers;
- 3) necessity of demonstrating their English proficiency and strong motivation for developing their own preliminary level of foreign language command.

MOOC platforms are simultaneously means of improving English and a tool for acquiring new and upgrading nascent knowledge (e.g. profession-related) and skills (like soft skills) through English. The variety of spheres, specifications, themes and educational means within courses as well as diversity of certificate eligibility criteria ensure that both user categories are satisfied – those who need learning beyond schooling, and those who need a certificate of achievement for their prospective employment.

The teachers of Dmytro Motorny Tavria State Agrotechnological University and Bogdan Khmelnytsky Melitopol State Pedagogical University who lead the study groups for students with advanced command of English, well-developed communicative skills and driving ambition of becoming a highly demanded IT professional, have developed a strategy to keep the participants of their groups motivated to maintain intense learning in the prolonged and undefined quarantine period. In spring 2020, most MOOC platforms decided to support potential users in the difficult times of the epidemic and succeeding financial crises. For instance, the most prominent MOOC Coursera platform has changed payment and certificate eligibility terms in order to allow access for more learners. Therefore, nine online courses have been selected and introduced to the IT specialists-to-be – they cover three educational aspects on three educational platforms – Coursera, FutureLearn and Prometheus.

The first aspect is a profession-related course on Cyber Security compiled by educators of universities in the USA and the UK (in English) and from a Ukrainian university (in Ukrainian). The second aspect has been aimed at various thinking skills development – creative, critical, logical and design thinking. The Coursera and FutureLearn courses are introduced by educational establishments, whereas the course on the Ukrainian language on the Prometheus platform has been adapted and translated

from a business school course. The remaining three online courses are the courses to which the group participants have been emphatically pointed by their English teachers. They are English for specific purposes courses specifically selected to meet the undergraduates' need to search for and to get a job and to be afterwards an effective employee in the English speaking professional environment.

The detailed information on the mentioned above nine courses and on their compilers as well as the grading according to the 5 point grading scale by the study group participants is displayed in table 2.

At the end of the spring term the study group participants were offered to enroll in the represented courses and to share their progress reports within the courses as participants and users of both desktop and mobile versions at the beginning of the autumn term. The students were also asked to analyse the website design, the site map and the layout, and what is more significant, the site user-friendliness. The study group participants have stressed the following positive aspects of learning beyond classroom: constant availability of entire course learning material, possibility of several topic repetitions and sufficient revision of puzzling themes, choosing their own learning time and pace, absence of annoying classroom competition, prior evaluation objectiveness, and various multinational community, equally motivated to succeed. The overall results have shown the course participants' strong preference for the Coursera platform, succeeding platforms are FutureLearn and Prometheus.

The Coursera platform has the first position in ranking by study group participants. The adaptive web design, and therefore fully functional mobile Android and iOS versions make it possible to use the platform on portable devices. The page design resembles an ordinary document, which is not overloaded visually, the colour palette is comfortable for users. The menu on the platform is easy to understand, it is quite logical and simple. All space on the page is used, and there is no overload in information blocks. Navigation is comfortable, visual ergonomics harmonizes well with the content of the pages. The beneficial feature of the Coursera platform is the availability of applications for Android and iOS.

The first aspect noted by the group teachers was foreign language learning. Good command of English is not only the precondition for prospective employment in Ukraine and abroad, but also a major prerequisite for application for a master course at all Ukrainian universities. Strong competition for state-funded postgraduate education among the applicants is the less powerful incentive than the chance not to be enrolled in the study at all if the demonstrated English level is insufficient. As the group participants are mostly senior students, who are aware of the forthcoming National entrance exam, they willingly signed up for the offered English courses.

The English for Career Development by Coursera, created by the University of Pennsylvania, is intended for learners who want to improve their English language skills and plan to be acquainted to the job search process in the USA. The course comprises five units covering the U.S. job application process, resume writing, cover let-

**Table 2.** Students' grading of courses on MOOC platforms

Courses	Coursera	FutureLearn	Prometheus
Profession-related course	Introduction to Cyber-security for Business University of Colorado <a href="https://www.coursera.org/intro-cyber-security-business">https://www.coursera.org/intro-cyber-security-business</a> 4.6	Become a Cyber Security Specialist The Open University <a href="https://www.futurelearn.com/courses/introduction-to-cyber-security">https://www.futurelearn.com/courses/introduction-to-cyber-security</a> 4.3	Information Security Basics (in Ukrainian) Igor Sikorsky Kyiv Polytechnic Institute <a href="https://courses.prometheus.org.ua/courses/KPI/IS101/">https://courses.prometheus.org.ua/courses/KPI/IS101/</a> 3.8
Soft skill course	Creative Thinking Techniques and Tools for Success Imperial College London <a href="https://www.coursera.org/creative-thinking-techniques-4.4">https://www.coursera.org/creative-thinking-techniques-4.4</a>	Logical and Critical Thinking The University of Auckland <a href="https://www.futurelearn.com/logical-and-critical-thinking">https://www.futurelearn.com/logical-and-critical-thinking</a> 4.0	Design Thinking for Innovation (in Ukrainian) University of Virginia, Darden School of Business <a href="https://courses.prometheus.org.ua/courses/course-v1:Prometheus+DTI101+2017_T3">https://courses.prometheus.org.ua/courses/course-v1:Prometheus+DTI101+2017_T3</a> 4.0
English for specific purposes	English for Career Development University of Pennsylvania <a href="https://www.coursera.org/learn/careerdevelopment">https://www.coursera.org/learn/careerdevelopment</a>	English for the Workplace British Council <a href="https://www.futurelearn.com/workplace-english">https://www.futurelearn.com/workplace-english</a>	English for Career Advancement (in Ukrainian) University of Pennsylvania <a href="https://prometheus.org.ua/english">https://prometheus.org.ua/english</a>

ter writing, networking and interview skills. Each unit includes educational videos on vocabulary and grammar explanation with following comprehension tasks, reading tasks and activities, writing tasks for peer-graded assignments. Each unit also has additional resources and exercises (reading tasks and practice quizzes) which are not obligatory for getting the course certificate.

Videos in the course are presented by the course authors, who are English specialists of the leading US universities. The contents of the videos explain the peculiarities of vocabulary and grammar usage, comprehension is checked while watching, but it is not graded. The playback rate of videos can be regulated in accordance with the student level of knowledge. English transcripts and subtitles, French, Russian, Thai, and Spanish subtitles for videos are available and can be downloaded on students' computers. Students can also make their notes by capturing a screen, pressing the "Save Note" button while watching videos.

Reading tasks comprise authentic texts from journals, magazines, newspapers or other current resources, some reading content has audio files for practicing correct pronunciation. Texts for reading have two versions according to their level of difficulty: basic or advanced, the latter can be a challenge for students as authors of the course state. Comprehension activities include question quizzes (multiple-choice questions, true/false statements, flash card activities, writing tasks). 70% or more correct answers guarantee the successful course passing. In case of low grades participants can reattempt to improve their grades.

Writing assignments, for the most part, are aimed at formulating student opinions, using comparisons and contrasting the job search stages in the USA and students' native countries. All the answers are to be original, not borrowed, and as it is stated on the page if they are, this "may

result in permanent failure of this course or deactivation of the Coursera account".

Certain periods of learning are scored by unlockable achievements in the form of the game success (getting a business attire, finding a job advertisement, etc). The Coursera Verified Certificate is awarded at the end of the course in case of successful learning. The certificate is not free, but participants can apply for financial aid on the course to get it.

The additional benefit of the course is the discussion forum where all the participants may consider different questions which can arise in separate week forums.

The FutureLearn platform has been ranked second by the study group participants. Its main page has the adaptive web-design, the visual content with tablet aspect ratio and visually simplified material presentation. All of the mentioned above is beneficial for distance learning on portable devices and smartphones. The colour match is bright and the main page looks informal and not informative due to the negative space layout. Nevertheless, the overwhelming white background drives users' attention towards the content elements through visual force concentrated on them and their bright colours. The drop down navigation reveals the intuitive user interface of the menu – numerous links with appropriate minimalist icons. In the rest of the page blocks, text descriptions are short, but all the necessary information is represented in linked images (pictures and partner logos), which direct users to corresponding URLs. The benefit of the mentioned simplified design is the possibility of making a choice: three top subjects are highlighted, succeeded by the View-all-subjects linked button. Four more featured courses are displayed below and complemented by the View-all-courses button, too.



In the mobile version, the colour tension strains users' attention by focusing it on key points of the website, which are few in number but instructive and explicative due to linked visuals. The main page scrolling is resulting and fast because adaptive design selects the best layout for the current screen size and in so doing the block number is moderate.

Being a participant of the English for the Workplace course on the FutureLearn platform, learners cover four following topics: finding a job, interviews, starting a job, working together.

Doing the course, participants work over audio and video instructional material and explanatory articles not exceeding 600 characters. The advantage and interactive feature of the course is Facebook live. This live broadcast is an educational session with the course lead educators, who answer the learners' questions posted in comments. The quizzes covered in each section of every week test both content comprehension and the grammar mastering level. The linear course structure is optional, users are not directed to proceed in strict succession and may skip activities and even quizzes, which is beneficial for avoiding losing interest and demotivation due to lack of time or grammar task complexity. Nevertheless, learners are notified via email about the next week's start and presented its content, which stimulates the participants to return to the course. Moreover, the free course access expires in 14 days after the last week ends, which is the best incentive to complete the course in time. To obtain the FutureLearn certificate a course participant must buy unlimited access to hundreds of FutureLearn short courses or upgrade on the specific course for a fee, complete 90% of the course steps and score over 70% on average across all course tests. No verified certificate is issued.

The FutureLearn platform demonstrates the comprehensive content approach and advanced user-friendliness. Its web design is uncommon but resultative, its call to action buttons are unobtrusive and at the same time effective. The ground concept of the platform is that course selection and progressing within courses is a combination of free choice of activities succession and a learner's self-discipline. The most beneficial feature is the FutureLearn community, willing to share, to peer-review and to assist other participants in mastering a course material.

The Ukrainian Prometheus MOOC platform has been ranked number three by the IT experts-to-be. The course attendants unanimously noted the obsolescence of the visuals of the Prometheus platform main page and the inconsistency of the colour match. So, for example, white and orange script and graphic elements upon the various backgrounds (infographics style and wallpaper) are hard to read and to perceive. The main page is overloaded with material types: the big introductory section using the drop down navigation is followed by a text block, slideshow tabs, then tab navigation elements follow, a block with a play-the-video button which turns out to be just a link to an advertised newly created or added course. The text block below represents the content of the previous text block about the platform advantages, then slideshow with partner establishments follows and, finally, there is a con-

tact and impressum block. The profile button is the only highlighted orange button in the drop-down menu, which is a direct call-to-action piece of content but its title in Ukrainian 'Cabinet' is confusing. An inscription like Log-in, User's profile or Account would better fit the button directing a participant to their courses. The resume of the main page review reveals strict and concise design, but it is overloaded with information due to its duplication.

In contrast to the main page, the introduction pages of specific courses have linear information representation corresponding to the strict content grid which is really helpful for comparing courses from different educators and choosing the suitable one. Every course description represents the following issues: a short course description (course goals, content compilers and educational organisation, syllabus, course duration, tutor profiles, certificate awarding terms, frequently asked questions section). Within courses, a separate block with answers and completed tasks of other students with the possibility of commenting and sharing their own answers gained the students' approval. Nevertheless, the design deficiencies are a progress line where only icons and not task types are displayed and using a mix of two languages in the progress section: the main menu in the course and the inscriptions of the embedded progress graph are in Russian, and all the text constituents are displayed in Ukrainian.

The mobile version of the site is the example of the adaptive web design and the content grid is transformed accordingly to users' swipes into a narrower but longer table. Nevertheless, the length of the main page and its content suggest that fixed long-scrolling would be more user-friendly than long-scrolling mobile version design. The fixed sign-in-block and course cycle drop-down positions would be sufficient for the front page users, especially for experienced Prometheus platform students.

The English for Career Development course on Prometheus was created by the University of Pennsylvania and the link to the original Coursera website is provided in the course description. The explanations in Ukrainian on how to use the Prometheus course are circumstantial and clear, the edited screenshots are of great assistance for anyone who would like to get an illustrative step-by-step instruction. There is also a strong recommendation to use the discussion section of the platform. The forum offers a great number of possibilities to speak out, to seek other participants' support and answers to puzzling tasks as well as communicative means to receive adequate feedback. The course attendants are welcome to download the certificate of completion, but the name validation is not implemented in the user account register form, just the options of the logging in via social networks. A verified certificate is issued upon fee payment and submitting web camera photos of user's watching the course lectures and their passports scans.

The content of the course includes texts, videos and quizzes. The texts are represented in two variants – for the Basic version of the reading (CEF Level A2-B1) and the challenging task (CEF Level B1) and a course participant can opt for any or both versions. Video tasks are the most appealing source of information according to the stu-

dents' review because of the video player which playing rate can be customized (from 0.50 to 2.0) and side subtitles accompany the narrative voice. Quiz questions are displayed on the same page, so that the viewers could replay the video in case of their uncertainty. The video content quiz is not assessed whereas reading task quizzes are located on a different webpage because only four attempts to solve the test are allowed. The course has been adapted by Ukrainian compilers effectively, the course description is instructive, but the progress line is confusing and defective in the platform mobile version. On the whole, the English for Career Development course is of great assistance to attendants who need to advance in separate themes and who do not strive for the course completion and are not aimed at obtaining the certificate.

The analysis of the platforms in terms of their main and distinguishing features is presented in table 3.

The teachers of computer science at Bogdan Khmelnytsky Melitopol State Pedagogical University have selected 10 online courses in disciplines which are crucial for future IT specialists. In order to ensure the impartial analysis of the mentioned above MOOC platforms concerning user-friendliness, design and layout effectiveness, as well as content relevance for prospective IT experts, three courses in cybersecurity have been recommended to the undergraduates of both universities. The enrolled students have submitted their grading as course users and potential course developers or facilitators. According to their assessment the most progressive approach demonstrates the Coursera platform: it offers a complex of four courses (the total duration is five months), each course is aimed at training the specific skills. The analysed course is Introduction to Cybersecurity for Business. It contains numerous videos and self-study text blocks on the most frequently occurring security issues. The MOOC FutureLearn platform has been ranked second. The course explains security challenges, cyber security laws, and risk analysis and management strategies. The distinguishing feature of this course is training cyber security and cryptography terminology – the ability to describe and explain their own routine tasks, duties and work results as a cyber security expert to non-specialists is rated highly by Ukrainian IT undergraduates. The Prometheus platform has been ranked third, but the course users have appreciated the learning material provided by the Ukrainian Zillya! antivirus laboratory. They recommend this course to public at large and they stress its intelligibility for non-experts.

The summarized opinion reveals that all the cyber security courses contain foremost concepts and strategies in specific topics, but the course completion depends on a user's need to be awarded a certificate of achievement.

The third aspect of investigating learning via online courses was the voluntary enrolling in the soft skills courses, selected by the study group teachers. The participants have chosen the course according to their preference for one of the analysed by them MOOC platforms and for the most appealing type and way of thinking (creative thinking, logical and critical thinking, design thinking) which they would like to master or enhance. The students' evaluation does not contain comparison with other

two courses because of personal inclination and personality type.

## 5 Conclusions

Online platforms are highly demanded by undergraduates and teaching staff due to temporary challenges, need to correspond to job market globalization tendencies and individual lifelong learning concept appreciation. The courses presented on solid MOOC platforms are compiled by reputable educators, contain cutting-edge concepts aimed at forming and developing professionally and socially relevant skills. The online courses for specific purposes are of great assistance as a part of university syllabi. Specific topics within an online course are highly demanded for filling gaps in one's knowledge. Some courses have a linear content structure, but most online assets encourage studying the most demanded topics first, nevertheless, an individual pace is strictly limited which is a powerful incentive to complete tasks in time. In respect to psychological preferences most IT undergraduates are attracted to online learning platforms due to prior evaluation objectiveness and absence of competition with group-mates. Adaptive web design allows easy transition between desktop and mobile versions, the platforms demonstrate user-friendliness and intelligibility for entry-level participants. The intercultural aspect of the Coursera and FutureLearn platforms in the form of a forum or a community is another distinguishing feature highly appreciated by Ukrainian users. The Ukrainian Prometheus platform provides mostly adapted courses of the prominent foreign universities, which is beneficial for users who strive to improve their knowledge and skills. To sum up, MOOC platforms tend to become more demanded and in complex with university education promise to ensure delivering highly qualified graduates and job seekers for both Ukrainian and foreign employers.

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**Table 3.** Main and distinguishing features of the MOOC platforms (Prometheus, FutureLearn, Coursera)

Courses	Prometheus	FutureLearn	Coursera
Design	Adaptive design Information overload on the main page	Adaptive design Bright palette including neon colours	Adaptive design Appealing colour scheme
Layout	Strict grid User-friendly navigation, intelligible menus and tabs Progress bars (defective display in the mobile version)	Negative space layout Tablet aspect ratio Simplified information display Beneficial for long-term learning using mobile or portable devices	Strict grid Visual ergonomics Side menu compatible with wide-screen devices
Content	Texts Video spots Video materials	Texts Video spots Video materials Facebook live broadcast Paid content upgrade	Texts Video spots Video materials Paid content upgrade
Communities	Separate block with written assignments with the possibility of commenting	Separate block with written assignments with the possibility of commenting	Separate block with written assignments with the possibility of commenting
Documentation	Free certificate	Two types of certificates: free certificate, paid certificate	Two types of certificates: free certificate, verified certificate
Applications	Android:Prometheus  AppStore -	Android -  AppStore -	Android: Coursera: Online courses AppStore: Coursera: Learn new skills

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## Management of educational institutions with inclusive education based on innovative technologies

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**Abstract.** The paper analyzes the theoretical and methodological basis of the organization of management of educational institutions, especially in the organization of management of educational institutions with inclusive education based on innovative technologies. Lack of conceptual and operational-practical aspects of management of educational institutions, which leads to spontaneity in the mechanisms of innovation management, lack of definition of target and value aspects of such changes, necessitates the development of a new model of management of educational institutions that would take into account new trends in inclusive education, provided favorable conditions for innovation, asserted humanistic values as a priority in the development of innovative educational space. The paper presents and scientifically substantiates the model of management of educational institutions with inclusive education based on innovative technologies, as well as key components of the organization of the educational process, which determine the areas of management in educational institutions. The algorithm of the introduction of managerial innovative technologies is offered, and also the innovative technologies which are necessary for the realization of the model of innovative management of educational institutions with inclusive training are systematized and analyzed. Analyzing the results of the experiment, it can be argued that innovative technologies are a necessary condition for successful innovation management. The introduction of innovative educational management requires an analysis of all stages of innovation, from the process of preparation to the introduction of innovations; finding out the direction of pedagogical processes, trends in their development, compliance with goals, identifying potential opportunities for the system.

### 1 Introduction

The modern theory of education requires a rethinking of the place and existence of man in education, in particular, requires a new dimension and realization of its qualitative potential. This, in turn, requires the integration of education into the world, changes in the management system in educational institutions, the introduction of innovation, focus on universal and national values, the transition to a new educational model based on the humanistic paradigm of learning, education, and personal development. The management system of an educational institution is a powerful regulator of innovation processes in the education system, a strategic link in the development of an educational organization.

Of particular importance in such conditions is the management of innovation processes that characterize the level of change in the educational organization, their focus, values. This approach determines the orientation of the mod-

ern education system to increase the index of inclusion in society and education.

At the same time, the lack of conceptual and operational-practical aspects of management of educational institutions leads to spontaneity in the mechanisms of management of innovation processes, the insufficient definition of target and value aspects of such changes. This, in turn, has negative consequences for reforming the education system. Therefore, there is an urgent need to develop a new model of management of educational institutions, which would take into account new trends in strategies for inclusive education, provide favorable conditions for innovation, affirm humanistic values as a priority in the development of innovative educational space. The urgency of this problem is evidenced by both research and surveys of managers, their deputies on the opportunities and effectiveness of innovative technologies in management to improve the education system based on innovative technologies and create an innovative educational space for students with special educational needs.

Recently, many scholars are paying more and more attention to the issues of inclusive education and the intro-

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duction of innovative technologies in the educational process.

The issues of democratic principles in education, its reorientation, an affirmation of spiritual values of national education, socialization of inclusion, and introduction of the system of inclusive education are revealed in the works of V. I. Bondar [1], V. A. Gladush [2] and others. Also, V. I. Bondar studied inclusive education as a socio-pedagogical phenomenon [1], V. A. Gladush considered postgraduate pedagogical education of speech pathologists in Ukraine [2].

The problems of inclusive education have recently been of interest to more and more scientists [3–7]. In particular, L. Daniela and M. D. Lytras are considered educational robotics for inclusive education [8], J. L. Geldenhuis and N. E. J. Wevers investigated ecological aspects influencing the implementation of inclusive education in mainstream primary schools in the Eastern Cape (South Africa) [9], A. W. McCrimmon studied inclusive education in Canada (issues in teacher preparation) [10], S. Chhabra, R. Srivastava and I. Srivastava learned the perceptions of school teachers on inclusive education in Botswana [11].

Also, M. P. Opoku, J. F. Agbenyega, W. K. Mprah, J. McKenzie and E. Badu studied perspectives of special educators [12], D. Donohue and J. Bornman considered the challenges of realizing inclusive education in South Africa [13], N. Muthukrishna and P. Engelbrecht considered decolonizing inclusive education in lower-income countries (Southern African educational contexts) [14].

However, despite the significant contribution of the above scientists, it should be noted that the issue of management of educational institutions with inclusive education based on innovative technologies is especially relevant today. Currently, the education system of Ukraine needs to improve governance mechanisms to establish and ensure an inclusive educational space that will be comfortable for all participants in the educational process and will allow modern society to move to international inclusive space. Today in the country, according to statistics, every second child is born with one or another deviation, which further requires the educational institution to reformat the training system so that such a child does not learn differences and be a full member of society in which it develops and grows. Accordingly, this leads to a reformatting of the management system in the educational institution.

The *purpose* of the work is to theoretically substantiate and practically test the effectiveness of the model of management of educational institutions with inclusive education based on innovative technologies.

## 2 Research methods

In this research was used methods, such as: theoretical: method of analysis, comparison, a generalization of scientific data from psychological and pedagogical sources to determine the purpose, content, methods, forms, ways to improve and optimize the management of educational institutions with inclusive education based on innovative technologies; pedagogical modeling to build a model of

management of educational institutions with inclusive education based on innovative technologies; empirical: questionnaires, interviews, interviews; statistical: a quantitative and qualitative analysis of research performance indicators; experimental: pedagogical experiment.

The research methodology involved the introduction of some scientific principles and approaches. Thus, the following approaches were used: synergetic, competence, personality-oriented, systemic, acmeological, activity, technological, task, innovative, adaptive.

Implementation of a systematic approach in the development of a model of management of educational institutions with inclusive learning based on innovative technologies takes into account the focus on creating a flexible, dynamic, democratic management system that uses variable management decisions, predicts results, includes innovative management mechanisms related to optimization management units adapted to the rapidly changing requirements of society and education.

Adaptive and activity approaches in the implementation of the presented model allow to consider the management process based on innovative technologies as a self-developing system, providing processes of improvement and development of collegial forms of management, unity of management and co-management, the formation of new relations between the educational institution and external environment. establishment of new forms of self-government.

It should also be noted that from the standpoint of synergetic and problem-based approaches, the modernization of the management of educational institutions is possible through the active use of both internal reserves and opportunities that determine the conditions of a changing environment.

At the forefront is the technological approach, which fully reveals management by technologization of connections and means of the interaction of all participants in the educational and management processes, which significantly improves the overall performance and expands opportunities for the introduction of innovative management technologies.

Implementation of the innovative approach provides conditions for systemic innovative changes in the activities of such institutions aimed at its development and improvement, promotes the introduction of new content and forms of management, integrated methods, information and communication, and interactive technologies of teaching and educating students, building a modern management structure, improves organizational and professional culture. The application of competence and personality-oriented approaches to the management of such educational institutions based on innovative technologies reflect the interconnected innovative individual activities of management entities, identify socially significant positions of the individual in the team, taking into account not only professional requirements but also personal needs of each participant.

The implementation of the proposed model involved the introduction of such principles as continuity, centralization, and decentralization, realism, dosage, con-

cretization, democratization, humanization, motivation, system, integrity, consistency and continuity, differentiation and individualization, environmental compliance, competence, integrity, integrity and collegiality, a rational combination of rights, duties and responsibilities, the presence of leaders focus on the need for continuous application of pedagogical innovations in inclusive education, management theory, regulatory support. Also, we have identified the basic principles of management, namely: the optimal ratio of centralization and decentralization in management; unity of unity and collegiality in management; a rational combination of rights, duties, and responsibilities in management; priority and systematization in management; replacement, redistribution, and division of labor in management, etc. This allowed us to orient the organizational structure of an educational institution with inclusive education, which includes some sectors: administrative, medical - psychological - health, educational - educational, educational - methodical (educational), inclusive - resource, information - monitoring.

### 3 Results

At the beginning of the study, a survey of 115 managers and their deputies was conducted. To the question "Do you use innovative technologies in your practice?" 58% of teachers answered "Yes", the dominant answer was "Partially" – 67%, and 20% answered "Yes" and get positive results (figure 1). The analysis of the survey showed that most of them are aware of the need to change the management system of educational institutions with inclusive education.

It was also noted that in some educational institutions, for many teachers, innovative technologies are a motivating factor for the introduction of elements of inclusive education, which facilitates the solution of many problems of children with special educational needs. Such technologies are also effective in training high school students who will soon cross the school threshold [15].

Timely introduction of innovation in the training of students with special educational needs expands learning opportunities, allows better learning curricula, develops skills for continuing education in higher education, and further expands their employment opportunities, thus creating additional conditions for the socialization of inclusion in society.

However, there are several serious problems in the management of modern educational institutions with inclusive education based on innovative technologies. Despite the call dynamics of the use of innovative technologies among the representatives of the teaching staff, the administration of the educational institution feels a sharp opposition of the team to the introduction of innovations. This is due to their orientation and traditional forms of work, due to the lack of motivation of some teachers for professional growth. Some leaders noted that, as a rule, the teaching staff at a fairly low level introduces innovative technologies in the educational process, due to lack of skills in working with information and communication

technologies, they are not always ready to create an inclusive educational environment. turn creates serious obstacles in establishing a management system in educational institutions with inclusive education based on innovative technologies.

#### 3.1 Model of management of educational institutions with inclusive education based on innovative technologies

Our study presents a model that is related to the direct practice of management in educational institutions with inclusive education, based on the introduction of innovative technologies. This model is built not only taking into account the theoretical content but also based on concrete and practical content of the work of educational institutions with inclusive education in the Zhytomyr city and Zhytomyr region.

The pedagogical content of our model is that it allows you to identify relevant and promising tasks related to the management of educational institutions with inclusive education based on innovative technologies, identify, study and scientifically justify the socio-pedagogical conditions for management and identify some innovative technologies educational management.

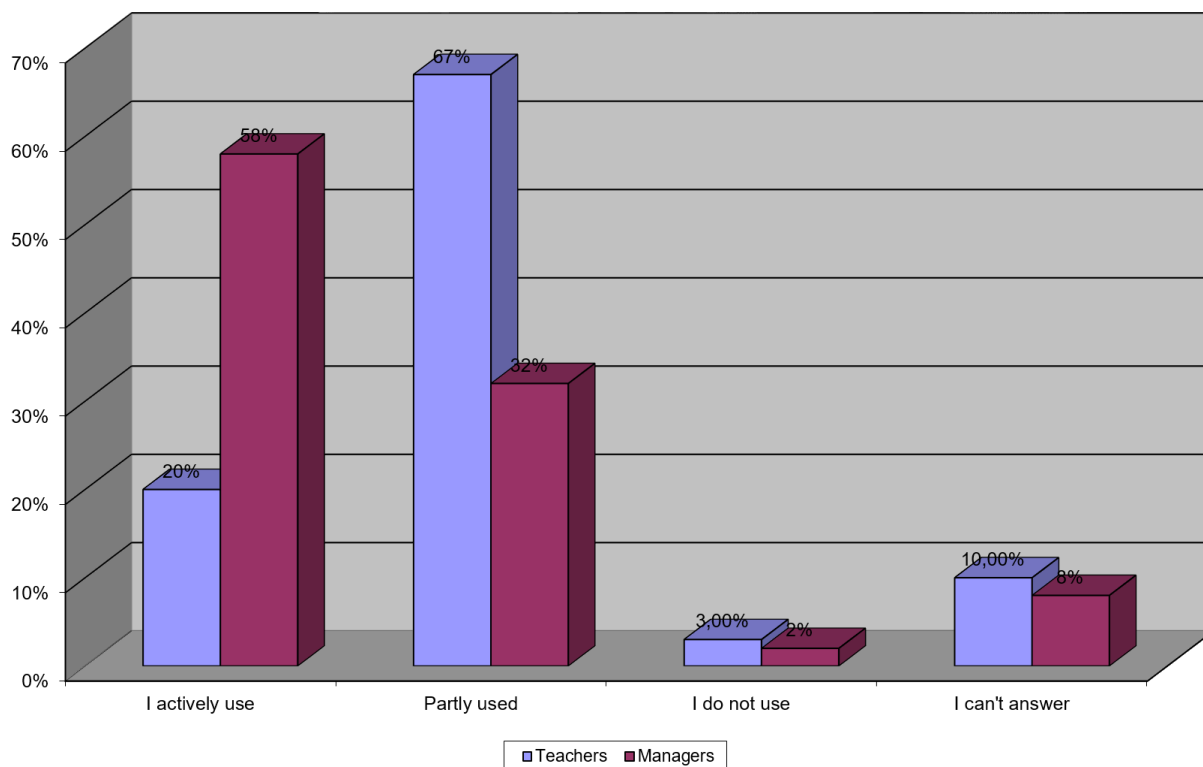
Developing a model of management of the teaching staff of an educational institution with inclusive education, which promotes the management process based on innovative technologies, emphasized that the administration of the educational institution influences the teaching staff, students and parents through management decisions and delegation of authority to the teaching staff.

Based on the above provisions, a model of managing the activities of the teaching staff of the secondary school to form a healthy lifestyle in high school students was created.

The theory of modeling interpreted by O. Tur [15] according to the following algorithm: identification of significant factors that may affect the outcome of solving the problem; selection of those factors that can be described quantitatively; combining factors on common grounds and reducing their list; establishing a quantitative relationship between the elements of the process. Also, this model allows you to integrate the efforts of not only managers but also educators, psychologists, social educators, other professionals involved in the organization and provided the educational process.

In the context of the researched problem, our model (figure 2) includes the following structural units: target, methodological, semantic, operational-activity, and evaluation-effective. These components of the model are implemented through management innovative technologies, taking into account socio-pedagogical conditions, through various forms and types of management actions, in the process of which the expected result of management of educational institutions with inclusive education is achieved.

The target unit defines the purpose of the expected results and requires the introduction of management modeling technologies, analysis of experience and resources of



**Figure 1.** Diagram of the distribution of respondents' answers to the question: "Do you use innovative technologies in your practice?"

the institution, closely related to other components of the model, in particular, determines their structure and content.

The methodological unit covers the principles and scientific approaches to the management of educational institutions with inclusive education based on innovative technologies. Thus, the main approaches are defined as synergistic, competence, personality-oriented, systemic, acmeological, activity, technological, task, innovative, adaptive.

Implementation of a systematic approach in the development of a model of management of educational institutions with inclusive learning based on innovative technologies takes into account the focus on creating a flexible, dynamic, democratic management system that uses variable management decisions, predicts results, includes innovative management mechanisms related to optimization management units adapted to the rapidly changing requirements of society and education.

Adaptive and activity approaches in the implementation of the presented model allow to consider the management process based on innovative technologies as a self-developing system, providing processes of improvement and development of collegial forms of management, unity of management and co-management, the formation of new relations between the educational institution and external environment, establishment of new forms of self-government.

It should also be noted that from the standpoint of synergistic and problem-based approaches, the modernization of management activities of educational institutions with

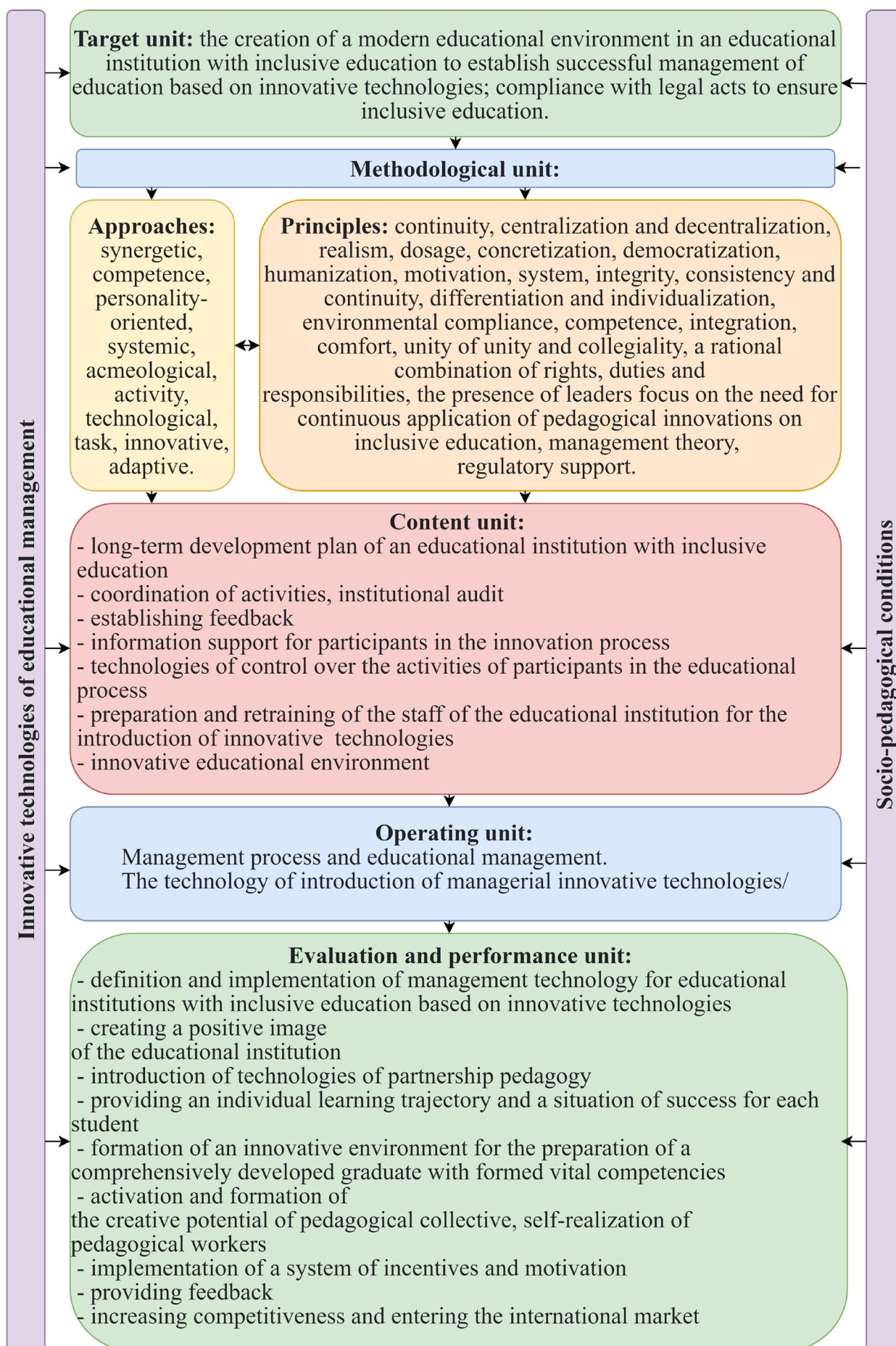
inclusive education is possible through the active use of both internal reserves and opportunities that determine the changing environment.

At the forefront is the technological approach, which fully reveals management by technologicalization of connections and means of the interaction of all participants in the educational and management processes, which significantly improves the overall performance and expands opportunities for the introduction of innovative management technologies.

Implementation of the innovative approach provides conditions for systemic innovative changes in the activities of educational institutions with inclusive education, aimed at its development and improvement, promotes the introduction of new content and forms of management, integrated methods, information and communication and interactive technologies of teaching and educating students, building modern management structure, improves organizational and professional culture. The application of competency and personality-oriented approaches to the management of educational institutions with inclusive learning based on innovative technologies reflects the interconnected innovative individual activities of management entities, reveals socially significant positions of the individual in the team, taking into account not only professional requirements but also personal needs.

Thus, the scientific approaches used in the study provide a scientific understanding of the management model of educational institutions with inclusive education based on innovative technologies.





**Figure 2.** Model of management of educational institutions with inclusive education based on innovative technologies

Given the management of educational institutions with inclusive education, we focused on such innovative principles as continuity, centralization, and decentralization, interdisciplinary approach, concretization, democratization, humanization, motivation, systemic, integrity, competence, integration, leading unity, a rational combination of rights, duties, and responsibilities, the presence of managers focus on the need for continuous application of pedagogical innovations on inclusive education, management theory, regulatory support.

The principle of continuity allows us to take into account that the quality of innovation management depends mainly on professional competence, personal qualities, erudition, spiritual culture, and creative attitude to the work of teachers in a cyclical process. Besides, the implementation of this principle also involves continuous training of teachers – “lifelong learning”, “education without borders”, “access to all levels of education”, “fair access to education”.

Accordingly, the principle of realism, which means the perception of reality through a system of relationships that act as an external force influencing the feelings, thoughts, and behavior of the child, serves as a source of replenishment of his social experience. Regarding the principle of environmental friendliness, it is he who ensures the compliance of all management activities of educational institutions with inclusive education based on innovative technologies for the formation of an appropriate lifestyle to the age and individual characteristics of each student. The use of the appropriate amount of information thought out in terms of volume and complexity, which can focus the attention of all participants in the educational process on the relevant issue ensures the implementation of the principle of dosage.

It is expedient to introduce the principle of comfort, which means the creation in the educational institution of such a social and psychological health-preserving educational environment, which is convenient for organizing the activities of each participant in the educational process of an educational institution with inclusive education. Implementation of the principles of differentiation and individualization involves the need to take into account age, gender, health, traditions, awareness, needs and provides differentiation of content, forms, and methods of work based on spiritual, social, mental, and physical health, motives and other characteristics of the individual. Taking into account the principles of sequence and continuity includes phasing and logical sequence of steps in the management process in a modern educational institution based on innovative technologies.

The principle of innovation of the management process is characterized by a focus on constant updating of the management process through the use of innovative technologies, structural and functional improvement, encouragement of initiative and innovation, which is a necessary condition for creative development, search for new approaches to training, education, management.

The principle of motivation for innovation is characterized by systematic stimulation of complex long-term innovation process in educational institutions with inclusive

education, providing conditions for experimental activities using professional and creative opportunities of teachers, support of innovative teachers, stimulating innovative initiative, initiative, and independence of management.

The principle of rational combination of rights, duties and responsibilities and the introduction of innovative technologies is combined with the principle of democratization in management, provides personal functional responsibility of participants in educational and management processes for their part of innovation, combination with collective forms of work, a delegation of powers to innovate within additional functional responsibilities at different stages of creation and implementation of innovation.

These principles reflect the constant trends and patterns of innovation management, as well as emphasize the importance and relevance of the problem.

To implement the model, some specific tasks were identified: to reconcile the goals of the development of the educational institution with inclusive education as a social institution with the goals of each participant in the educational process. It is important to guide the teaching staff on the path of the introduction of innovative technologies and to determine the guidelines for success in the process of innovation, common values, positive motivation for the change of all participants in the educational process. It is necessary to determine the priorities for education in today's inclusive education. The motivation system plays a key role. It is necessary to motivate school teachers to exchange experiences in the form of round tables, master classes, seminars, press releases, to create an electronic page on the school portal on the problem of research. An important point is the moral support and motivation of members of the teaching staff in various areas of inclusive education. The main tasks include systematic professional development of teachers, taking into account the uniform requirements for the organization, and effective activities of the teaching staff. It is necessary to define a system of delegation and involve teachers in all stages of management. Aspects of innovation should also be introduced into the work of methodological associations of school teachers. It is important to monitor the satisfaction of all participants in the educational process and internal audit of management activities.

Fulfillment of these tasks will allow to determine the state of innovative development of educational institutions and to obtain some indicators of management efficiency based on innovative technologies. In particular, indicators of development of the innovation space of the educational institution: conditions, condition, the functional efficiency of all subjects of the educational process, the degree of openness of the institution, communication links, quality of innovative products. Among the indicators of the results of the educational process is determined by the level of education and upbringing of students, the level of socialization of inclusion, the level of social, motivational, and functional competence. Indicators of the level of management of innovation processes: the level of forecasting changes, the level of organization, regulation, and correction of innovation, the level of examination of innovations.

### 3.2 Characteristics of innovative technologies that are necessary for the implementation of the model of innovative management of educational institutions with inclusive education

The technology of the introduction of new in the course of the decision of actual problems of an educational institution. This technology makes it possible to solve the management task – to ensure the focus of innovation to address specific problems that exist in this institution, and to overcome the inertia of the institution. This technology includes five main stages. The name of each stage reflects its purpose and place in the system of management actions:

- 1) preparation of innovation,
- 2) the introduction of a new one,
- 3) organization of teachers' activities for mastering and applying the new,
- 4) preliminary results of innovation activity,
- 5) dissemination and improvement of new experience.

*Innovation project management technology.* Management task – optimization of management actions in the process of managing an innovative project. This technology encourages the maintenance of the independence of the objects of management, which is provided by the head in the form of an order or instruction, in which part of the managerial powers is transferred to the appropriate group of teachers to perform any new responsibilities. As a rule, such obligations are the task of developing or implementing pedagogical innovations, and groups that are partially independent (perhaps even with a separate current account in the bank) are groups of designers of pedagogical innovations who report directly to the scientific and methodological council, work together with scientific consultants and scientific institutions. In this case, almost every group of creative teachers can partially become the subject of management.

The algorithm includes three main stages: preparation of innovation, testing of innovative ideas, and consolidation of innovation in vocational education. It reflects the process of making management decisions made as to the final steps of each stage.

*The technology of analysis of experience, problems, and resources of the educational institution.* Management tasks – identifying the specifics of a particular institution, its need for renewal, its innovative capabilities. This technology allows you to design the long-term development of each institution based on innovation, to take into account its features, reflected in the triad “experience – problems – resources”.

When using this technology:

- experience of the teaching staff – is divided into positive and negative, traditional and innovative, original and borrowed, single and repetitive;

- differentiated by the hierarchical level in the organizational structure of the educational institution and the direction of work in which it exists;
- relevant problems for this educational institution – are determined based on the ratio of the institution's experience with current problems of society, students, parents, teachers, employers;
- are considered in conjunction with the experience of the institution, while identifying contradictions in the work that needs to be overcome;
- in the structure of resource provision of the educational institution are allocated financial, logistical, personnel, information and structural and organizational resources of the institution, which, in turn, are divided into internal and external;
- analytical conclusions are based on the direct and feedback links established in the process of analysis between the experience, problems, and resources of the institution.

*Collective planning technology.* Management tasks – the organization of collective planning of work, development of the innovative project in the group; implementation in the process of planning the needs and opportunities of participants in future innovation.

An innovative approach to creating the preconditions for the introduction of innovative CL technology is the development of a business plan and a clearly defined strategic goal, which provides what the educational institution will do to achieve its goals. The main characteristic of the strategic goal is future orientation.

Marketing activity should be a component of business planning. It is one of the features that distinguishes business planning from traditional types of planning. Marketing analysis helps to assess the “market” opportunities of the institution, i.e. the ability to provide exactly those educational services in qualitative and quantitative terms that are needed today in the labor market.

The basis of marketing activities is to monitor target audiences. The target audiences are students, entrants, graduates, and employers. The reason for this separation of segments is that it must work according to a market system, which is a set of interconnected markets: the education market and the professional market provides educational services to consumers, the consumers of which are physical entities (students) and at the same time offers the products of its activities (graduates – skilled workers) to the labor market, the consumers of which are legal entities (enterprises, organizations, and institutions of various industries).

As a result of collective planning, a set of tasks is formed, the implementation of which ensures the achievement of the result “seen” at the beginning of the project, and a group of like-minded people is created, each of whom represents joint work and role.

*The technology of long-term development of the basic innovative idea.* Management task – to ensure the maximum realization of the educational potential of innovative

ideas in the long-term development of the educational institution by enriching the common idea with partial innovations.

The main stages of technology implementation:

1. Preparatory stage (detailed project development).
2. The formation of innovation (formation of the contingent of participants in innovation activities – students and teachers; the beginning of the implementation of innovative educational programs and projects of the educational process).
3. Development of an innovative idea (gaining experience of the subject activity, improvement of activity, improvement of quality of its results, development of new kinds of activity, the formation of traditions, the achievement of the social usefulness of projects, development of co-management).
4. Stable functioning (accumulation of experience of the traditional activity, acquisition of stability by the system).
5. Updating (crisis prevention and overcoming stagnant trends).

The fifth stage should again be followed by the stages of development (3rd) and stable development (4th), which allow to multiply and improve the work experience, connecting the new with the traditional and selecting the most effective forms, methods and techniques. In the future, the consistent cyclical implementation of the stages of renewal, development, and stable operation provides long-term development of the basic innovation idea.

*Technology to support educational initiatives and pedagogical creativity.* Management task – to provide the necessary conditions for the formation, promotion, and implementation of productive innovative ideas by the subjects of innovative activity (within the educational institution and in interaction with the environment).

Management support in this technology is implemented through a set of measures to intensify innovation. Support covers various stages of educational initiatives and pedagogical creativity: idea formation, idea nomination, project development, approbation, implementation. At each stage, support acquires its specificity due to the uniqueness of management tasks and a combination of management support techniques.

*Management modeling technology.* Management task – optimization of the process of creating and applying management models as ideal systems. It allows you to deeply comprehend the actual existing or newly formed objects of management, to predict their development.

The implementation of this technology includes an algorithm: statement of the problem for which the model is created; construction of the model, which begins with the definition of the main purpose of the model, as well as “input” (necessary data, resources, conditions, assumptions) and “output” (desired and achieved result); introduction of this model in management; checking the effectiveness of the implementation of the model according to the criteria

of management evaluation; model update (performed if the required data about the object or new information appears, which should also be included in the model).

*The technology of self-correction of pedagogical activity.* Management task – the organization of independent work to eliminate their shortcomings in the preparation and implementation of certain segments of the educational process. This technology is implemented using two main tools: a package of process tables and a self-correction algorithm. Technological tables serve as reference material and reflect the structure of professional competence in the field of elimination of pedagogical errors and allow the pedagogical worker to work on them independently.

Self-correction algorithm:

- 1) highlighting the shortcomings in pedagogical activities in the analysis, self-analysis;
- 2) work with technological tables, which takes place when performing certain operations;
- 3) awareness of the possible negative consequences of the error and the need to eliminate it in their work (self-motivation);
- 4) finding out the reasons for the error (introspection); definition of tasks for work on error elimination (self-goal);
- 5) modeling of the activity directed on elimination of an error (self-construction and self-organization);
- 6) practical implementation of the model of activity to eliminate the error;
- 7) self-analysis of the effectiveness of work on the error.

*The technology of the educational and methodical game.* Management task – the development of interest of teachers in innovation through the introduction of game elements in the structure of methodical work. This technology covers the development and conduct of educational and methodical games. Game development in technology begins with the creation of two models: simulation and game. The simulation model reflects the specifics of the professional activity of the specialist. It includes the goals of the activity, the subject of the game, a graphic model of the role interaction of the game participants, the system of evaluation of results. The game model creates the social context of the game, covers a set of roles and functions of players, the rules of the game, can include a script.

*The technology of development of educational work.* Management tasks – optimization of activity of pedagogical workers in the development of original educational business, action; ensuring the pedagogical effectiveness of the author’s forms of educational work. The technology covers the following stages of development of educational work: thematic planning, preliminary (draft) planning of work, editing of the plan, final registration of the plan of educational work. Each stage is accompanied by a general algorithm for its implementation and a reminder for the teacher-beginner.



*The technology of organized innovative change of management states.* Management task – optimization of the process of creating and applying innovative changes in management, which allow a deep understanding of the existing objects of management, to predict their development and implementation. This technology involves a certain system of management, which covers the stage of preparation for changing the state of the management system and the stage of their implementation.

*Fundraising technologies.* The development of market relations and the use of alternative sources of financing have a significant impact on the renewal of management mechanisms. Fundraising technologies are being actively introduced into the practice of modern school work. Fundraising, as a set of different methods and procedures for finding resources for the implementation of socially significant school projects, requires the head to strengthen the relationship with the external environment of the school. The effectiveness of such activities depends on the ability to optimize public relations by ensuring maximum openness of the school. Methods of organizational and stabilizing influence, organizational and technological influence, and socio-psychological ones come to the fore in the management of the school organization, which ensure effective cooperation of all those who have expressed a desire to cooperate with the school.

*ICT.* The technologization of all aspects of the development of the social sciences has led to changes in the technology of school management. This approach is primarily associated with the introduction of new ICT, they not only allow much more efficient processing of large amounts of information and more quickly make management decisions, but also resolve conflicts that arise between modern requirements for the functioning and development of the institution education and outdated technologies used by school principals; between the pace of development of the managerial and managed subsystems of the secondary school. However, there are often problems with the lack of management software designed for school principals, which is quite subjective due to the inability of a significant number of principals to use computers properly. On the other hand, in the context of technologicalization of educational processes, there is also a danger of underestimation, and sometimes ignoring the humanistic principles in management technologies. There is an exaggeration of the importance of virtual communications, pragmatism. Here we must emphasize the circumstances that cause this situation: the complexity of management objects and processes in the modern school, each of which is a complex, polystructural, and multifunctional dynamic system. Innovative development of society, education requires a rapid change of management and educational technologies.

### **3.3 Implementation of the model of management of educational institutions with inclusive education based on innovative technologies**

The dynamics of development of the innovation space of an educational institution is characterized by the unity of

external and internal environments, which requires consideration of environmental conditions. An educational institution with inclusive education is a complex open system that must constantly respond to changes in modern society, so the strategic thinking of the education manager is one of the conditions for the progressive development of an educational institution.

In the regulation of development, a significant role is played by the coordination of joint actions and management decisions, ensuring equal opportunities for self-development of each participant in the educational process. Therefore, the main features of the progressive development of innovative educational space of educational institutions with inclusive education we see the integral unity of all processes that occur in the development of educational space of the school; functional efficiency of all subjects of the educational process of the school; development of the educational space of the school-based on humanistic pedagogy and psychology.

The management of educational institutions with inclusive learning based on innovative technologies is closely related to the management of changes that are constantly taking place in the institution and require appropriate leadership. However, we have that every development implies change, but not every change is development. Scientists note that development is a change that is associated with internal restructuring, progress. Therefore, for this forward movement to be progressive, purposeful management of such a process is needed.

Since the effectiveness of the management of educational institutions with inclusive learning based on innovative technologies depends on the effectiveness of change management in the institution, we will identify objects that need constant change. Among them: the system of intra-school management, the development of the school organization, the management of the teaching staff, and the management of the development of the educational institution. The mechanisms for managing such changes include methods of involving teachers, students, parents, and the public in in-school management, which contributes to the expansion of the subjects of in-school management and strengthens the position of self-government of the school organization. Empowerment and delegation of managerial powers will strengthen the responsibility of each subject of the educational process for the changes that take place in the institution. The increase of in-school management facilities due to development processes will allow the educational institution to move from the mode of operation to the mode of development.

Ensuring the adaptability and flexibility of management organizational structures, their openness, and ability to change is important in updating management systems. Thus, the mechanisms of optimization of communication and information relations between the subjects of management, the focus on change and self-development of the subjects of internal school management play a significant role. Therefore, self-education becomes an important indicator of readiness for change on the part of both the school administration and the staff.

Connections approaches and organizational culture are important criteria for the quality of change in the management of an educational institution. Therefore, it is important to preserve human potential in the management process, recognition of morality as a leading quality of members of the teaching staff; ensuring partnership in relations between members of the educational community, increasing informal ties in the organizational structures of the educational institution.

Management of an educational institution based on innovative technologies is determined by the level of conditions created for professional activity, the quality of the system of incentives for innovative activities, the principles of cooperation, the nature of the interaction between participants in the pedagogical process.

Important mechanisms for structuring and developing the community in the educational institution are: providing favorable conditions for the development of the innovative potential of each teacher in particular and the teaching staff as a whole; providing a diagnostic approach to identifying the creative potential of the teacher, the possibilities of his personal development and growth; optimization of incentive systems for innovation (creating a situation of success, supporting teacher initiatives; freedom of action, free choice of forms and methods of educational process), teacher involvement in research, exploration activities; expanding the scope of contacts between participants in the educational process; optimization of the development of scientific and methodological work of the institution.

Communications play an important role in the organization of management because management structures are characterized by a significant number of both external and internal connections. Therefore, the quality of the relationship between all components of the management system is one of the indicators of its focus. Connections perform not only the functions of ensuring the viability of the system, but also determine the nature, direction, functionality of the system, its ability to self-development. They ensure openness of the system, interaction between all subjects of management (administration, teachers, students, parents, the public) on the principles of partnership, cooperation.

Manufacturability in modern conditions is an important component of the quality of management. As a form of existence of activity, technology generates a system of necessary management actions and their results. Using management technologies the interaction of the head with teachers, parents, the public is carried out.

Thus, all components and components of the model of management of educational institutions with inclusive education based on innovative technologies and projected on the result: definition and implementation of technology of management of educational institutions with inclusive education based on innovative technologies; creating a positive image of the educational institution; introduction of partnership pedagogy technologies; providing an individual learning trajectory and a situation of success for each student; formation of an innovative environment for the preparation of a comprehensively developed graduate with formed vital competencies; activation and formation

of the creative potential of pedagogical collective, self-realization of pedagogical workers; implementation of a system of incentives and motivation; providing feedback; increasing competitiveness and entering the international market.

According to the specified, we offer an algorithm for the introduction of administrative innovative technologies:

1. Substantiation of the need for the introduction of management innovation technology (based on the identified problem and the formulation of the management task).
2. Decision-making on the introduction of managerial innovative technology.
3. Introduction of managerial innovative technology.
4. Tracking the process of application of innovative management techniques.
5. Analysis, control, and evaluation of the process and results of the implementation of management innovation technology.
6. Deciding to continue the use of innovative management technology or to stop working on it.
7. Recommendation for the use of innovative management technology by other managers.
8. Summarizing and analyzing the results of the introduction of innovative management technology.

Thus, this understanding of innovation processes allows us to consider innovation as a purposeful process of creating, disseminating and using innovations, where the main properties of such changes are the focus, dynamism, and new quality of the innovation product. Among the categories of the innovation process can be distinguished: the life cycle of innovations, classification of pedagogical innovations, innovative technology, innovation strategy, innovation project, innovation program. These categories have become the starting point in the system of management of innovation processes in secondary schools.

Educational institutions should be provided with highly qualified pedagogical staff, constantly take care of their level of training, regularly monitor their internships at enterprises, training courses, attend master classes, innovative exhibitions. For young pedagogical workers, it is necessary to renew and carry out training in "School of the young teacher", to create councils of mentors, to realize the project "Young teacher" that would help to adapt young workers in collective.

An important condition for the introduction of innovative technologies in the management of educational institutions is the forecasting of reversible or irreversible structural changes in the innovative socio-pedagogical environment, taking into account the law of irreversible destabilization of the pedagogical innovative environment in which the institution operates. The innovation environment cannot exist without such opportunities and collapses under the pressure of pedagogical innovations.

As a result of management based on innovative technologies, the educational institution becomes competitive. Changes in the current socio-economic development of Ukraine require a significant increase in the creative potential and competitiveness of graduates of educational institutions with inclusive education.

### 3.4 Experimental results

The experiment on the research topic took place during 2018–2020. The effectiveness of the developed model was tested based on ten experimental educational institutions, which turned out to be the most open to change. The choice of educational institutions was carried out by the method of free choice in such a way that the experiment involved institutions of different types, differing in working conditions, some students and teachers, experience management of their leaders.

In the process of experimental work, the main empirical methods were used, namely: methods of collecting information: observation, interview, conversation; methods of information processing and analysis. We developed a questionnaire that contained questions that allowed us to assess the content of the work of the head and staff of the institution on the implementation of management based on innovative technologies. A survey of representatives of the administration, teachers on the state of the practical application of innovative technologies in the management of educational institutions with inclusive education. 115 heads of educational institutions and their deputies, 106 employees of institutions (teachers, psychologists, speech therapists, assistants), 8 parent councils of educational institutions (110 people) were involved in the survey.

Here are some survey results. To the question: “Do you implement innovative technologies in professional activities?” among the surveyed respondents, 59.6% said, “Yes”, another 23.4% – “Partially”, 4.3% – answered “No”, “Rather no than yes” and “Rather yes than no” – 6.4% (figure 3).

The main reasons why today’s innovative activities were identified as follows: increasing the level of interest and involvement of children in the educational process (70.2%), interesting to create something new, unusual and better than it was (68.1%), the possibility of individualization of educators and dissemination, implementation of own experience (53.2%), growth and support of the image of the educational institution among parents and students (48.9%), the possibility of creating an individual learning trajectory for students (42.6%), improving their image (42.6%), challenges of the information society (42.6%), academic mobility (34%), motivation and support of management, governing bodies (23.4%), support and growth of image policy among other educational institutions (21.3%), the presence of healthy competition in the team (19.1%), a sense of self-esteem and self-affirmation (17%), fierce competition between educational institutions (12.8%).

In the course of answering the question: “Are the conditions for the development of innovative activity created in your institution?” only 31.9% of respondents answered

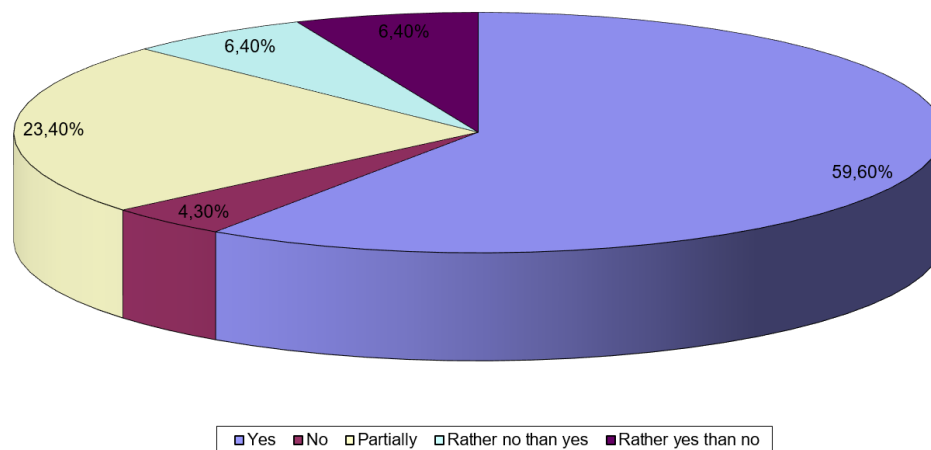
“Yes”, 48.9% answered that “Partially”, 12.8% – “Rather yes than no”. This indicates the correctness of the focus of our study (figure 4).

The main reasons that create obstacles in the process of innovation were the following: insufficient awareness of innovations (44.7%), lack of necessary theoretical knowledge (38.3%), the predominance of traditional forms of activity (40.4%) weak system of motivation activities on the part of management (31.9%), the weak internal motivation of professional activity (25.5%), limited and lack of time and effort for the application of innovative technologies (53.2%), fear of innovation risk and change (31.9%), lack of support from the government (36.2%), lack of teachers-innovators in the team (19.1%), lack of career growth (19.1%).

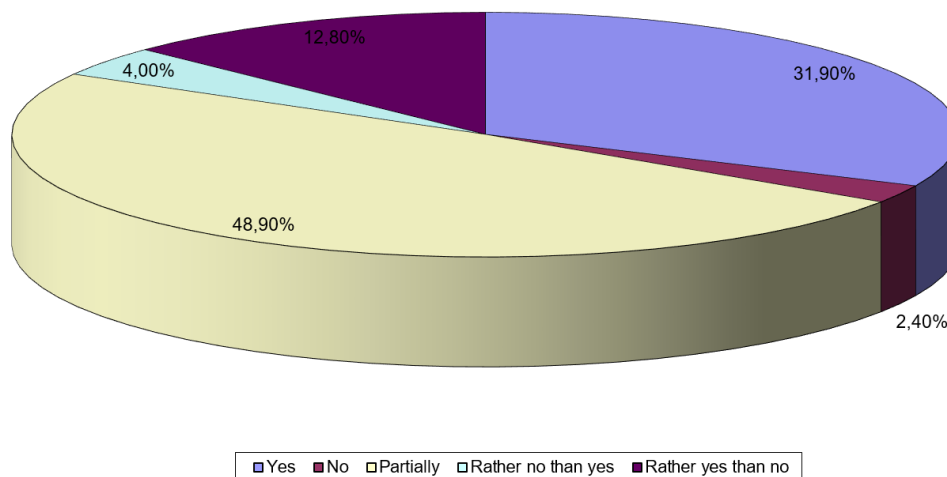
In the course of the research, we were asked to rank the factors that inhibit the development of innovation in your educational institution from the least important to the most. Thus, the most important factors that create obstacles to the introduction of innovation are resistance to change on the part of the team, unwillingness to violate stereotypes of behavior and learn a new activity; orientation of pedagogical workers on traditional forms of work; features of centralization of the management of the system of general secondary education institutions; weak material and research base of the educational institution; lack of a program for the development of innovative activities of your educational institution; lack of material and other incentives for the educational institution as a whole and for administrative, pedagogical and technical staff.

To study the views of teachers on the assessment of positive changes that have taken place in the educational institution with the use of innovative technologies, the answers to the question “Have there been changes in innovation activity in your educational institution?” were analyzed. The results of the answers and their analysis allowed us to draw some conclusions about changes in the educational inclusive process with the use of innovative technologies. Namely: “Yes” – 31.6%, “No” – 16.3%, “Difficult to answer” – 17.7%, “Rather yes than no” – 21.3%, “Rather no than yes” – 4.3%, “At the stage of innovation in educational activities” – 4.1%, “At the stage of innovation in management” – 4.7%.

The analysis of the answers to the question that occurred with the use of innovative technologies in the management and educational process of the educational institution showed the following picture: the introduction of computer-oriented, integrated lessons (53.3%); improving the quality of the organization and conduct of practice (44.4%); the possibility of creating a modern educational space (37.8%); creation of conditions for participation of pedagogical workers in all-Ukrainian and regional exhibitions, carrying out of competitions on the basis of educational institution (31.1%); the possibility of improving and adapting curricula and programs (28.9%); use of textbooks, manuals, methodical recommendations developed by teachers (26.7%); increase in the index of inclusion in education (24.4%); gradual change of management style (24.4%); generating promising pedagogical experience (20%); the opportunity to share experiences



**Figure 3.** Diagram of the level of introduction of innovative technologies in professional activity



**Figure 4.** Diagram for assessing the availability of conditions for the development of innovation

and enter the international market for educational services (15.5%); increased enrollment of students (13.3%); nothing has changed (4.4%).

In the process of implementing the model of management of educational institutions with inclusive education based on innovative technologies, we also analyzed and investigated in which category of employees of your institution the level of innovative activity has increased. Thus, from 2–3 variants of answers chosen by respondents from the list of proposed (15) it was determined that: teachers – 70.2%, administration – 38.3%, individual teachers – 31.9%, heads of institutions – 27.7%, educators or assistants or tutors – 19.1%, parents – 16.2%, deputy heads – 14.9%, psychologists or speech therapists – 12.8%, social educators – 12.8%.

The results of the study showed that in the management of individual heads of educational institutions with inclusive education there are indicators of innovation (use of innovative methods in the teaching system, creation and implementation of author’s teaching and scientific manuals, project activities, Internet use, implemen-

tation of educational innovations) and increased competitiveness (availability of additional investment, computer support of the educational and production process, growth of material and technical base, improvement of production conditions of the team, functioning of the internal system of professional growth of teachers, implementation of a personality-oriented system of professional education, provision of additional educational services).

During the study, it was determined what qualities (not more than 10 of the proposed), knowledge, skills, and abilities (not more than 6 of the proposed), necessary for the administrative staff of the educational institution to successfully implement innovative technologies.

The survey found that most managers consider it necessary to adaptive management style, develop their professional competence, learn to make non-standard decisions, self-education, initiate and implement innovative management processes. Thanks to research observations and interviews with members of the teaching staff of educational institutions of the Zhytomyr region, it was found that the



image of the modern head of the educational institution is significantly different from that formed a few years ago.

## 4 Conclusions

Thus, at the stage of reform development of educational institutions, the ability of the head to apply the principle of innovation in management is important, which is one of the priorities and is characterized by various manifestations, namely: support for innovation, creativity, initiative, and independence of management; organized innovative change of the state of the education system with inclusive education - the transition from spontaneous innovation processes to consciously managed; information, logistical, staffing of the main stages of innovative educational processes; forecasting reversible or irreversible structural changes in the innovative socio-pedagogical environment; strengthening the sustainability of innovative educational processes; accelerating the development of innovation processes.

Thus, after analyzing the results of the experiment, we can say that innovative technologies are a necessary condition for successful innovation management. The introduction of innovative educational management requires an analysis of all stages of innovation, from the process of preparation to the introduction of innovations; finding out the direction of pedagogical processes, trends in their development, compliance with goals, identifying potential opportunities for the system.

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## Modern education technologies: 21st century trends and challenges

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**Abstract.** Since modern technologies produce new global education trends, education prospects redesign, and new opportunities and threats assessments are needed. The new educational technology development phase was researched as an answer to modern world challenges. The strategic priorities of education in the EU are analyzed. New technologies, practices, and related needs: financing, digital integration, accessibility, informational security were studied and generalized. Higher education key trends and their transformation in the context of the COVID-19 crisis new opportunities and threats were researched. The analysis of the seven years of NMC Horizon and other research emerging educational technologies adoption forecasts provided in the research shows significant discrepancies related to extreme uncertainty. Five educational trend groups from the NMC Horizon report 2020 were reviewed. The author defined the remote education tools and their importance on the example of the university providing online/mixed learning. The anonymous polls among lecturers and students performed in the spring of 2020 (just after the COVID-19 quarantine announcement) show the most highly demanded tools are Google Meet, email, specific learning systems such as Moodle. The barriers to fully-fledged remote education are technical problems and occasionally poor Internet connectivity. The participants are quite ready to learn and to use digital tools for education. However, the absence of live communication increases workload during online learning, and other factors arise as the factors lowering student activity. During severe transformation, the main tasks of education are accessibility and diversity.

### 1 Introduction

Global challenges of the modern world should be answered with new ways of social development. The best scientists, industry leaders, and civil society actors empathize with the dominance of outdated philosophical doctrines and economic models in recognized world theories. Global Financial Stability Report describes the enormous uncertainty in all spheres [1], which is proved by the instant correction of the current year world economic growth rate forecast [2, 3].

In the Jubilee report, the Club of Rome concludes that to overcome old thinking leading to a catastrophe we need new enlightenment [4]. The authors of the report call to fundamentally transform the mindset resulting in holistic vision, an integral view of the world complexity based on a systematic approach. Innovative education should be a response to the current global challenges. Education was seriously transformed since the beginning of the century – systems, forms, methods, and technologies were changed [5].

In the development concept of the digital economy and society of Ukraine for 2018–2020 [6] education digitalization was defined as the latest phase of education informatization [7] supposing informational and educa-

tional environment saturation with electronic digital devices, tools, systems, and electronic and communication exchange. The exchange enables integral interaction of the virtual and the physical, and so creates cyber-physical educational space.

Educational technologies development and usage in educational methodologies at the current stage of social development are addressed by S. Amelina [8], O. Bondarenko [9], O. Burov [10], V. Bykov [11], A. Gurzhii [12], A. Kiv [13], M. Kislova [14], T. Kramarenko [15], O. Lavrentieva [16], O. Markova [17], I. Mintii [18], Y. Modlo [19], N. Moiseienko [20] N. Morze [21], P. Nechypurenko [22], V. Osadchyi [23], N. Rashevskina [24], S. Semerikov [25], S. Shokaliuk [26], M. Shyshkina [27], V. Soloviev [28], O. Spirin [29], A. Striuk [30], S. Sysoieva [31], I. Teplytskyi [32], V. Tkachuk [33], T. Vakaliuk [34], K. Vlasenko [35], N. Volkova [36], O. Yankovych [37], Y. Yechkalo [38] and others.

Scientists [39] believe educational technologies represent a common strategy of education and education consistency development. O. Yankovych, Y. Bednarek, and A. Andzheyevska highlight cross-cutting information technologies that span all groups of technologies used in educational and managerial processes and technologies [40, 41]. According to O. Topuzov, O. Malykhin, T. Yarmolchuk new information era requires an effective influence on professional personality development processes, which should change the mindset, and improve the

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innovative and creative potential of education applicants [42]. G. Kovalchuk specifies the main directions of higher and secondary education transformation in economy and business, implying the integration of education with industry and science, the transition from generalized to personalized education, creativity development [43].

V. Bykov [44] stressed the relevance of informational education development, ICT skills development in educational systems among students and citizens. This in turn requires new tasks for psychological and pedagogical science and educational practice.

In M. Kademiia's opinion, the research of the modern pedagogical technologies, ICT, ICM-technologies adoption in the educational process, and informational and educational environment creation gives a possibility to introduce electronic, mobile, pervasive, and life-long learning [45, 46].

I. Dychkivska noted the innovation in pedagogics related to overall processes in the society, global challenges, integrative knowledge, and social choice forms [47]. O. Tovkanets named the following strategic directions in ICT development in European countries: innovative pedagogical approaches, educational models and strategies development and testing; ICT adoption on all phases of education; creation of the open platform of IT, digital content, services, pedagogical concepts and approaches, motivation models, cloud technologies in educational space; improving digital skills and ICT adoption across the whole educational system; introducing open educational environment in higher educational institutions on a managerial level; digital educational systems modernization; international quality standards adoption [48].

N. Novolokova divided pedagogical technologies development in world educational space into three phases: first (1920–1960), second (1969–1970), and modern [49]. The scientist thought modern pedagogical technologies originated from pedagogical and technical ideas expressed by pragmatic psychology and pedagogy founders, «industrial pedagogy» representatives. We agree that the technology revolution gives pedagogy a new meaning [48]. However, in the early 21st century the development of the Internet, mobile communications, cloud technologies, AI development, etc. fundamentally changed the education organization and methods. So we could identify a separate phase in educational technology development from 2010 until now.

At the same time, today it's important to research this new phase in educational technologies development, taking into account rapid society informatization, all spheres of human life digitalization, modern world challenges, and the necessity to react to them.

The research goal is studying and generalization of modern educational technologies; global trends systematization; defining education prospects and threats in the context of society digitalization.

## 2 Background

The educational policy for all levels should be defined to solve the education transformation tasks. However, till

now Ukraine does not have a solid document, which regulates public policy on education.

By the «About National education development strategy in Ukraine for the period up to 2021» decree of the President of Ukraine provides for the formation and development of the national education according to modern integration and globalization processes, post-industrial civilization transition requirements. These measures are aimed to achieve sustainable growth and development of Ukraine in the first quarter of the 21st century, national educational system integration in European and world educational space [50]. The Strategy defines the education development priority in modern information and communication technologies adoption, which improves the educational process, education accessibility and efficiency, and prepares youth for life in an information society.

Reflecting on the current challenges Ukrainian and foreign consultants, experts, and NGOs developed the Ukraine Digital Agenda 2020 [51], which defines pivotal digitalization policies, priorities, initiatives, and projects of Ukraine for the 2017–2020 period. The «Ukraine 2030 – the country with developed digital economy» project of The Ukrainian Institute of the Future [52] stated education as one of the basic elements of the (digital) innovation ecosystem and the overall digital economy.

The Ukrainian Institute of the Future's [52] states education as one of the root elements of (digital) innovation ecosystems and the overall digital economy. For education digitalization of Ukraine digital economy and society development concept 2018–2020 [53] provides the following measures: educational resources and digital platforms with interactive and multimedia content support; innovative computer and multimedia educational means and equipment for digital educational environment creation design and implementation. One of the digital competencies of citizens KPIs is for 95% of the youth from 16 to 20 years old to have basic digital competencies in 10 years, and digital adaptation programs are carried out for citizens older than 50 years before 2030 [52].

It appeared that rapid development and active usage of informational, in particular digital, technologies in all spheres of life require a systematic approach to education system transformation.

## 3 Results and discussion

In recent years experts proposed best practices for education digital transformation [54, 55]. The measures of digital competencies for citizens (DigComp), educators (DigCompEdu), educational organizations (DigCompOrg), and consumers (DigCompConsumers) were developed [56]. The strategy of research directed to research ICT influence on the educational process, and to distinguish several descriptors for modern human digital competencies monitoring and evaluation «Learning and Skills for the Digital Era» was announced [54].

Digital Education Action Plan [57] determines the main priorities of the educational system in the context of rapid digital changes:

1. Digital technologies adoption for teaching and learning.
2. Digital and digital transformation competencies development.
3. Educational system improvement with Big Data analysis and foresight.

Today the main obstacle for innovation development is a drastic lack of personnel. There are no more than 22,000 professionals with Ph. D. in Artificial Intelligence, and at the same time, there are more than 10,000 open vacancies. In Europe, by 2020 a 20% increase in time spent using innovative technologies is expected, and a 65% increase in time spent using basic technological competencies. In the next ten years, 90% of positions will require digital skills. By 2030 the demand for professionals with social and emotional skills will continue to grow by nearly 22% in all industrial branches of Europe [58].

To be able to make decisions regarding the prospects of the creation of an educational setting we need to analyze world tendencies. The Organisation for Economic Co-operation and Development (OECD) report 2019 specifies three key trends influencing the outlook of education:

- 1) globalization;
- 2) digitalization;
- 3) population aging.

Under the influence of world globalization processes in the nearest ten years, the middle class will constitute the majority of the world population. This trend will influence providing better education for more people and the satisfaction of more demanding clients. International mobility growth is leading to the necessity of integrating students from different social groups resulting in political and social tensions.

Anticipating education development population aging should be taken into account: in the recent 45 years the average lifespan in OECD countries from 70 to 80 years. It's presumed that the percentage of people older than 65 years will grow.

Older workers will face job market uncertainty, the need for retraining, and advanced training will increase. So mastering the latest technologies requires digital literacy and critical thinking.

At the New Media Consortium initiative, the Horizon project was created about 20 years ago [59, 60]. The project is about emerging teaching and learning technologies aimed to help adopt innovations in educational institutions with expert research and analysis. The expert group from different countries prepares the NMC Horizon Report. Technologies are evaluated according to various criteria, but the main is the potential for teaching, learning, and research in higher education. The experts from 71 countries drawn by the EDUCAUSE association outline the landscape and select the most valuable tendencies forming higher education, teaching, learning, and research. Authors notice that each trend may have a lot

of specificities not mentioned in the report depending on higher education institution type, world region, etc. 65% of the experts represented the USA and 35% – Australia, China, Egypt, France, Taiwan, and Great Britain. The experts tried to generalize and highlight global trends, but they did not deny the existence of other ones.

In Horizon Report 2020 [60] the experts analyzed and distinguished the key trends forming the future of higher education for the next five years and technological practices influencing education development. The report highlights five key trends groups: social, technological, economic, higher education, and political.

**Technological.** AI development, next-gen digital learning environment formation, analytics, and privacy questions. AI is already used worldwide as a part of educational services and educational programs. AI adoption increase is foreseen for gathering feedback from students, and as a virtual assistant. Moreover, it may be used for improving access to education for people with visual or hearing impairments. The next-generation digital learning environment (NGDLE) disrupts the way institutions build educational ecosystems for students, and instructors by providing a more flexible and mobile educational process organization and planning. However, higher education institutions should keep privacy standards high, make partnerships carefully, and secure safe data exchange.

**Economic.** Higher education cost, work, and skills future, climate change. The significance of education as a response to global challenges is assumed to grow. The efficient procreation of knowledge and skills required for life and work as the preeminent task of education should be carried out at a reasonable price. Otherwise, the funding will be decreasing continuously for higher education institutions in many countries.

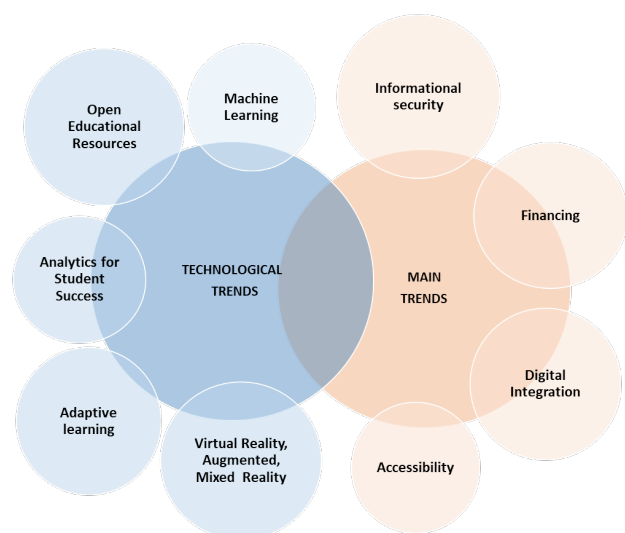
**Higher education.** Student population changes, alternative paths to education, online education. The vision of higher education, its goals, and its dominant beneficiaries is continually changing in response to transformation in the human mindset and social, political, and economic relationships. It's crucial to build higher education models and practices adopted for these trends and metamorphosis.

**Political.** The decrease in higher education funding, higher education value, political polarization. Higher education will continue to influence politics from educational policies and legislation to the political discussions held on campuses.

**Social.** Well-being and mental health, demographic changes, equity, and fair practices. Well-being and mental health initiatives at universities should help the growing student population with anxiety, depression, and related concerns. A fresh perspective on higher education tasks is vital concerning continuous demographic changes in the global population. The question of education diversity and accessibility remains highly relevant. Figure 1 represents key educational technologies, practices, and challenges.

Ukrainian scientists name common aspiration to various computer tools and ICT (like electronic libraries, handbooks, learning programs, computer-aided testing, simulators) integration in uniting curricular and methodical complexes [61]. These complexes may include elec-





**Figure 1.** Key educational technologies, practices, and challenges

tronic informational products; digital information materials; software applications; tools and means for creating digital instruments of education; digital learning tools; complex and additional tools; specialized informational Internet resources [61].

Navitas Ventures research projects the traditional educational process to be reconstructed with digital models of education in the nearest 10–15 years, but it appears that transformation is accelerating due to new quarantine challenges.

Table 1 represents the predictions of the educational technologies implementation for the last seven years in the NMC Horizon Report (the time when the technology appears in the report marked in 'X').

Horizon-2020 report authors remarked that they stop to forecast some technologies' adoption timeframe due to the fickle COVID-19 crisis, which forced higher education institutions to accommodate in record time and to work with available technologies to be able to provide educational services.

Noone predicted the phenomenal growth of MOOCs for 2020, but there are about 5,490,000,000 results in the Google search engine for the query «online courses».

In Ukraine, the successful cases of EdTech (educational technologies) implementation are the Prometheus – MOOCs platform; Preply – educational platform for finding an online tutor; Coursmos – an online micro-learning platform; Highbrow – educational courses email service, etc.

Chatbot helped the applicants with the Application Campaign 2020 on the Ministry of Education and Science of Ukraine website, and some of the higher educational institutions websites, National University of Water and Environmental Engineering in particular. Digital assistant chatbots functionality in the educational space lies not only in answering the frequently asked questions but also in providing students with study materials or promoting discussions. AI allows personalizing the educational process by

analyzing the learning curve slope and recommending a personalized learning plan, which improves student academic performance.

Virtual and augmented realities are one more digital educational instrument, which gives the possibility to conduct experiments. Google Play and App Store propose a lot of mobile applications with Augmented Reality, but there is not sufficient content in Ukrainian to hold interactive classes.

According to the anonymous online survey during the first months of the 2020 coronavirus quarantine, the most prevalent tools used in education are Google Meet, email, and specific education platform Moodle with study courses, tasks (figure 2).

The anonymous survey results show near 4% of students do not engage in remote learning. Technical problems, along with bad Internet connectivity were named as obstacles to remote learning by 69% of respondents-lecturers and 31% of students. Respondents highlighted the following negative factors of remote learning: low student engagement, live communication absence, increased workload, and extra time for preparation for classes. 76% of students and 83% of lecturers wanted to continue remote learning. At the same time, 24% of students and 17% of lecturers voted firmly against it.

It came as a conclusion that both students and lecturers are ready to embrace modern educational technologies.

In late 2020, other surveys confirmed our conclusions about the difficulties and opportunities of modern learning, especially in crisis conditions.

2020 EU Public consultation results [63] show:

- almost 60% of the respondents had not used distance and online learning before the crisis;
- 95% consider that the COVID-19 crisis marks a point of no return for how technology is used in education and training;
- respondents say that online learning resources and content need to be more relevant, interactive, and easy to use;
- over 60% felt that they had improved their digital skills during the crisis and more than 50% of respondents want to do more.

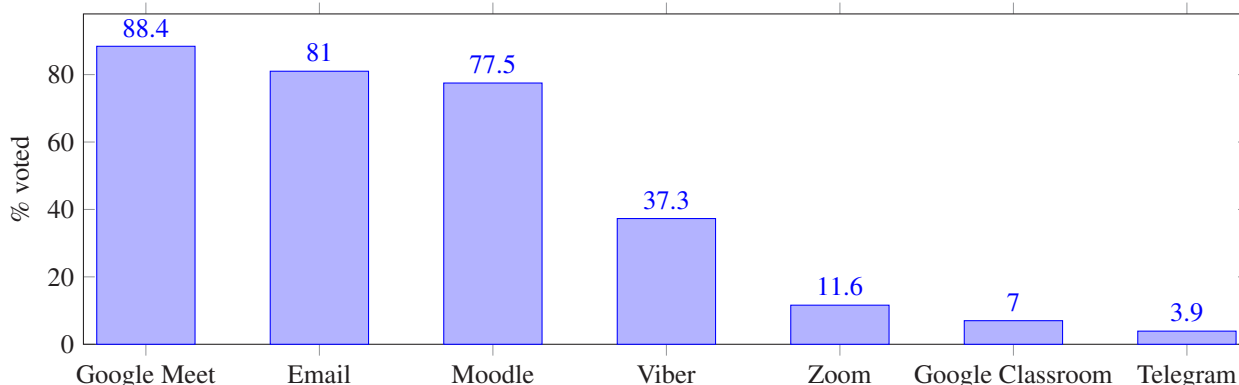
## 4 Conclusions and future work

World higher education is facing unprecedented challenges. Educational institutions work with cutting budgets, and applicant numbers decrease. At the same time, Industry 4.0 requires continuous information technology updates and new educational methods usage. The job market has a great need for professionals with skills in data analytics, cloud computing, artificial intelligence, and machine learning. However, the classical education system has limited capabilities in preparing such specialists.

Key trends force educational institutions to provide more relevant, accessible, and flexible academic programs; to improve online/mixed learning; to split educational programs; to personalize approach to a student.

**Table 1.** Educational technologies implementation in the world for the 2012–2019 period (based on Horizon Report 2019 [59])

Educational technologies implementation	2012	2013	2014	2015	2016	2017	2018	2019
Analytics Technologies	X	X	X		X		X	X
Adaptive Learning Technologies				X	X	X	X	
Games and Gamification	X	X	X					
The Internet of Things	X			X		X		
Mobile Learning	X					X		X
Natural User Interfaces «Bring Your Own Device»	X					X		
Makerspaces				X	X		X	
Flipped Classroom			X	X				
Wearable Technology		X		X				
3D-printing		X	X					
Tablet Computing	X	X						
Artificial Intelligence						X	X	X
Next-Generation LMS						X		
Affective Computing					X			
Mixed Reality					X		X	X
Robotics					X		X	
Quantified Self			X					
Virtual Assistants			X					X
Massive Open Online Courses		X						
Blockchain								X



**Figure 2.** Remote learning tools (based on survey [62])

The response to a challenge is Lifelong Learning development opportunities for teachers, trainers, and other educational staff, new technologies adoption promotion, and improvement of digital skills in education and training. State digitalization strategy requires education adaptation to new requirements. The researches and surveys show that educational workers and students are ready for the changes on their end.

Education, industry, and academy integration remains the main priority. However, Ukrainian educational institutions continue to consume new foreign technologies without producing any.

Higher education institutions practical activity is achieved by various industry internships for students, lecturers, and professors participation in grants and research programs without improving educational institution material and financial base, and creating opportunities for further development of its potential.

We have two likely future scenarios. The first is public support in the creation of innovative research centers. The second is a transition to private educational centers with high fees to be able to update digital technologies, and train or hire professionals. The second scenario also means that quality education will not be affordable for most of the population leading to further state economy recession.

The paradigm that education is an economy serving industry, should be put behind. New challenges drive giving education priority among other spheres since further digital society development depends on highly qualified citizens. Digital technologies force to review the approaches to restricting information, to enable public authorities to use strict measures to information management and control. In our opinion, the contradiction between the need for new technologies and old management control leads to the death of the economy and education relationship as we

know it. Today there is an urgent need to secure proper education and science financing. Other industries need public authorities control reduction since the control is an elite attempt to preserve old ways of developing and leading.

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## A research on transformation of social wellbeing and life attitudes in students from the occupied territories and the demarcation line at relocated higher education institutions from the east of Ukraine

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**Abstract.** We connect the urgency of the article with the preservation of the integrity of Ukraine in the conditions of military conflict. The article describes the research on transformation of the current state of social wellbeing and life attitudes in students from the occupied territories of Ukraine under conditions of relocated higher education institutions. The goal: to study the transformation in social wellbeing and life attitudes in the mentioned strata of students under conditions of operation of a relocated state higher education institution. The methods: analysis, synthesis, generalization, specification, systematizing, comparison, documentation study, interviewing, mathematics statistics methods. Scientific novelty: theoretical foundations and the essence of reintegration of such students, as well as the measures are determined that facilitate it: information and explanatory work, socio-educational, psychological, pedagogical, socio-economic, and legal ones. It is proved that national-oriented upbringing is the priority in successful reintegration on condition of solving students' problems. The results: the efficiency in the use of the mentioned measures is proved by transformational changes related to overcoming the imbalance between the social wellbeing indicators (the level of life satisfaction, interest in life, general mood) and life attitudes (focus on process, result, freedom) of such students.

### 1 Introduction

The authors consider the article as being topical due to:

1. The need in ensuring the conditions for the utmost implementation of the right of student youth from the occupied territories and the demarcation line in the east of Ukraine on education at higher education institutions (HEI). This issue is new for education management.
2. The need in preserving the Ukrainian nation's identity, its unity, patriotic attitudes, and loyalty to the national Ukrainian idea: the United, Indivisible Ukraine by means of education. This requires special, purposeful educational work at HEI which prior did not fulfill such work and did not bear such responsibility before the society and did not fulfill such function and load.
3. The presence in the current Ukrainian society of the migration, new socio-political and economic, and globalization processes; a growth in the volume of

information flow observed on the background of social instability and new communities formation lead to changes in the mode and way of life of many categories and strata of population, their working conditions, and their ideas of culture, world outlook, way of life, the values system. The corresponding processes under conditions of the military conflict in the east of Ukraine, the tension and disinformation make urgent the need in processes of preserving the national identity, uniqueness, health, in critical thinking and sustainable society formation as protective mechanisms in the face of threat to national security [1, 2]. These and other aspects are part of the work of academic groups' curators and socio-psychological services at HEIs, but methodologies and recommendations concerning the students from the occupied territories and the demarcation line have not been developed yet.

4. The youth is especially vulnerable category in the aspect of correctness / incorrectness of life priorities placement, which is determined by their insufficient life and social experience. This, as proved by a research [3], complicates the building-up of a clear prognosticated estimation concerning the position of the state, it often prevents the youth from making a correct choice, causing numerous contra-

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dictions in their life strategies and disrupting their inner logic and wholesomeness. Besides, a young person's social wellbeing is one of the most important constructs that determines different aspects of a person's relations with the world, their success, assimilation of social skills and norms, and values-and-sense self-determination within these norms [4–6]. The goals and tasks of educational, social, and psychological work in this direction are not determined for a HEI, in particular for those working with the students from the demarcation line and the occupied territories.

5. Students are the social group, which due to its formal organization and common values, a subculture, becomes a radical motive power of society (the 2013 pro-European Maidan in Kyiv was triggered by students' protestations and their struggle for European values), therefore it is important to direct students' movements at peaceful settling of conflicts, to know students' attitudes, bring them up on patriotism and the culture of peace that again requires special work with such students, overcoming their negative life experiences wherein such students saw manifestations of war culture.
6. The students from the east of Ukraine, particularly from the occupied territories and the demarcation line, are greater patriots than their peers from other territories, for they have made their choice in favor of remaining the citizens of Ukraine, having lost for this sake social and material benefits (housing, parents nearby, friends), but as a result of this they experience bigger problems with socialization and the necessity in satisfying basic needs. All the children in the east of Ukraine have a psychological, and sometimes a physical, trauma, with which they live (shellings, deaths, wounds, bombardments, hunger, lack of medical assistance, loss of home, etc.), they often perform the roles of adults in the family (of the absent father or mother), they have lost childhood prematurely and taken care of other family members (grandparents, brothers or sisters), they have learnt family economy and taking care of and serving themselves early [7]. This determines premature adulthood in students and inflicts additional physical, psychological, social, economic load on them. Moreover, the problems of adapting and integrating into a new education environment, a students' hostel add up to this, which means practically complete breaking of social ties they had before entering Ukrainian HEIs, the problems of socialization in a group of peers who have not experienced occupation, internal displacement, and psychological traumas. All this reflects on inner world, the values, behavior, and learning of students from the occupied territories and the demarcation line at HEIs in the east of Ukraine. This calls for separate research and special work with such students.
7. As research prove [8], the difficult socio-political situation in the east of Ukraine causes the need in broadening the lines of counteracting its negative consequences through activation of multilevel and multifaceted information, socio-psychological, migration, and other influences that act as one of the modes of ensuring social security and reintegration measures. This problem gains special urgency under conditions of operation of a relocated HEI, which, unlike common HEIs face additional challenges connected with solving the problem of reintegration of students at the institution simultaneously with the issues of forming the due conditions for such reintegration in the circumstances of their relocation. The Ministry of Education and Science of Ukraine (MES) does not have statistics as to the number of children from the occupied territories who enter HEIs through the general procedure by passing school-leaving certification testing. As for the simplified procedure of entering HEIs, it was introduced in 2016 and supposed that children and youth from the occupied territories can enter certain education institutions whose list was limited [9]. In 2020, application was made possible to any education institution [10]. Overall, in 2019, 1600 persons entered HEIs through the "Donbass – Ukraine" education center [11], in 2018 – 1522 people. In 2017, there were 1346 of them, and in 2016 – 855 people [12]. Therefore, the number of children and youths from the occupied territories involved into the Ukrainian education system keeps growing, which attests to their stable support of Ukrainian state, patriotic choice, and requires to build up work with them at HEIs concerning their integration and adaptation, as well as solving the socialization problems. Nevertheless, at the majority of HEIs, this work is currently at the stage of intuitive search for ways and methods and is problem-oriented at solving present-day issues.
8. The topicality and at the same time insufficient development of this research problematics in scientific works should be noted. The regional, social and group peculiarities should be taken into account when studying student youth' life plans and orientations under conditions of Ukrainian society and statehood's current involvement, according to M. Alyohin [3]. Meanwhile, there has been no such research concerning the category of HEI students in question. S. Gorbatiuk turns attention to the need in estimating the social wellbeing level in population, the indicators of which enable evaluating the state of social sphere objectively [13]. Efficient public and social management is based on diagnostics of population's problems and needs. For HEI, it is important to be aware of these problems and those of different categories of students, including internally displaced persons and those from the occupied territories and the demarcation line. This would enable conducting target work with such students.

Elucidation of the issues of children's and youth' life perspectives and expectations, their social and psychological wellbeing in conditions of threats and challenges is represented in works by foreign researchers: V. Gil-Rivas et al. [14, 15], G. Kerestes [16], L. Saupe et al. [17], R. Seginer [18], L. Stark et al. [19] etc. Reintegration of young people into society after war in various aspects (political, social, economic, psychological, etc.) was researched by A. Honwana [20], A. Bryden & V. Scherrer [21], A. Giustozzi [22], M. Humphreys & J. Weinstein [23], et al. Nevertheless, their works were not related to students and work immediately with them in the direction of values, social wellbeing, life attitudes. From the position of directedness and personality's ideas formation, of scientific interest is the study by D. Matyukhin [24], where he views young people's social attitudes as components of lifestyle that represent in themselves a certain persistent and fixed construct, which gives stability and direction to a person's activity and is manifested in his/her social interaction and behavior. This conclusion is important in the context of ensuring sustainable development of a personality, a community, and the society. Lifestyle in conditions of learning at a relocated HEI by the category of students in question was not researched either. Therefore, theoretic and empirical researches within the context of the problem of student youth's reintegration into relocated HEIs and their social wellbeing and life attitudes are virtually non-existent, which was the reason for organizing such a research on the basis of the Luhansk Taras Shevchenko National University. Among other things, the university scientists started science-and-research activities concerning comparing the data as to the hierarchy and value orientations of the Donbas youth obtained in the course of interviewing in 2013 (prior the conflict in the east) and in 2018 (during the conflict) [25]; comparative analysis of the views of young people from temporally occupied territories on the events in Ukraine in 2014 – 2019 [26]; determining the conflictability level of social environment in Luhansk area and teachers' readiness for influencing processes of reconciliation and establishing peace [27]], and others. In previous researches of the studied issue, the authors accentuated on the need in forming and demonstration in everyday life the behavior based on the culture of peace and accentuating its advantages over the behavior based on the cult of war, demonstrating negative consequences of behavior based on the culture of war for every person, community, country of the world, and the planet [28]; a research was undertaken concerning the determining a personality's socio-psychological deformation indicators under conditions of the hybrid war [29]; the social characteristic of children and youths as victims of the hybrid war in the east of Ukraine was presented [30]. In the context of society globalization and informatization processes, a research of so-

cial wellbeing and life attitudes of student youth are of special topicality in society and of scientific novelty in the theory of general and social pedagogy and social work, because the conflict in Donbas is one of the crucial challenges to the national security of Ukraine [31], it dehumanizes social relations, causes estrangement, leads the society to spiritual and moral regress [2]. It should be noted that the authors' research on social wellbeing and life attitudes of students from the occupied territories and demarcation line is conducted not in terms of comparing them prior and during the military conflict, but in terms of their transformation immediately under conditions of a relocated HEI operation directed at reintegration of the youth from these territories into the Ukrainian environment. Departing from the aforementioned, the goal of this article is a research on transformation of social wellbeing and life attitudes in students from the occupied territories of the east of Ukraine and demarcation line under conditions of operation of a state higher education institution (on the example of the Luhansk Taras Shevchenko National University) in the context of their reintegration into the Ukrainian environment.

The tasks of the research:

- 1) to study the current state of social wellbeing and life attitudes in eastern Ukraine HEI students from the occupied territories and the demarcation line at the stage of their admission to a relocated higher education institution,
- 2) to determine theoretical foundations and the essence of the notion of reintegration in work with students from the occupied territories and the demarcation line under conditions of a relocated HEI
- 3) to generalize from practical work the measures aimed at successful reintegration that make an impact on social wellbeing and life attitudes of students from the occupied territories and the demarcation line under conditions of a relocated HEI,
- 4) to perform an estimation of transformational changes in social wellbeing and life attitudes of the eastern Ukraine HEI students from the occupied territories and the demarcation line following the introduction of the mentioned measures under conditions of a relocated HEI operation.

## 2 Methodology

In the course of the research, the following methods were applied: analysis, synthesis, generalizing, specifying, systematizing, comparison, documentation study, interviewing, mathematic statistics for comparing, evaluation and interpreting the obtained results of the initial and final diagnostics as to the transformation of social wellbeing and life attitudes of students from the occupied territories and

the demarcation line. The students' life attitudes were determined in accordance with the methodology of determining a personality's socio-psychological attitudes by O. Potyomkina [32]; the social wellbeing index – by the “Satisfaction with life” test in N. Panina's adaptation [33]. The students' life attitudes were determined departing from the supposition that a personality's attitude is the stance of treating a goal or tasks that is manifested in selective orientation at and readiness for activities that facilitate accomplishing them [34]. The methodology [32] enables determining the extent of a personality's socio-psychologic attitudes directedness at “process – result”, “altruism – egoism”, “freedom” – “power”, “work” – “money”. Because social wellbeing includes an individual's subjective feelings as to his/her satisfaction with different aspects of their activities [35, 36], is associated with the integral satisfaction with life [37], and is viewed as the reflection of life quality and the completeness of measuring it [38], to determine its index, the authors applied the “Satisfaction with life” (SWL) test as adapted by N. Panina [33]. The test enables determining the general level of satisfaction with life (social wellbeing) that includes such its aspects as interest in life, determination, commitment and consistency in achieving the goals, correlation between the set and the achieved goals, evaluation of one's own traits and actions, and general mood background.

The research was conducted at the base of the Luhansk Taras Shevchenko National University within the scientific project of “Socialization of pupils and students youth from the east of Ukraine under the hybrid war conditions in Donbas” (2018 – 2020), state registration number 0118U003335 [39].

211 students who entered the university through the “Donbas – Ukraine” educational center took part in the experiment, 106 of them being from the occupied territories and the demarcation line, and the place of residence of the other 105 students was in the safe zone. In the course of the experiment, results interpretation was made with the use of the Statistica 12 program. The research meets the requirements of research ethics.

### 3 Results

In 2014 Luhansk Taras Shevchenko National University being in the epicenter of terrorist groups' crimes, suffered repressions, and seizure and ruining its premises. In order to continue full-fledged activities, the university was relocated to the town of Starobilsk. The training process organizing at the university is maintained on the principles of mobility, flexibility, and constant search for new efficient forms of interacting with students, ensuring education quality, forming in students a balanced life attitude, the ability to perceive, obtain, apply, and broaden the necessary experience [40]. According to the Development Strategy of the university, its mission is to ensure training of competitive specialists on the basis of organic unity of high-quality student-centered training, scientific work, creativeness and patriotism development, and future reintegration of the occupied territories [41].

Starting since 2016, Luhansk Taras Shevchenko National University performs admission of school-leaving applicants from the east of Ukraine, uncontrolled territory, and the demarcation line through the “Donbas – Ukraine” educational center. Thus, in 2016, the number of such applicants was 149 people, in 2017 – 224, in 2018 – 219, and in 2019 – 191 people. Correspondingly, the total number of students during those years amounted to 783 people from the uncontrolled territory and the demarcation line. As of 13.01.2020, the number of students from the uncontrolled territory who entered through the “Donbas – Ukraine” educational center and are studying at the university is 433 people [42].

In order to determine the current state of social wellbeing and life attitudes in students from the occupied territories and the demarcation line, in December 2018 diagnostic-and-analytical work was conducted, in the course of which the data obtained were compared by these indicators regarding the students from the occupied territories and the demarcation line ( $n=106$ ) and the students whose residence was in the safe zone ( $n=105$ ).

The verification of all distributions in the social wellbeing indicators in the studied groups by the Shapiro-Wilk and Kolmogorov-Smirnov criteria demonstrated that they do not obey the Gauss law, which determined the use of non-parametrical methods of mathematic statistics. By means of Mann-Whitney's  $U$ -criterion, all social wellbeing indicators were compared for students from the occupied territories and those from safe zones. Results of the initial diagnostics by these indicators are presented in table 1.

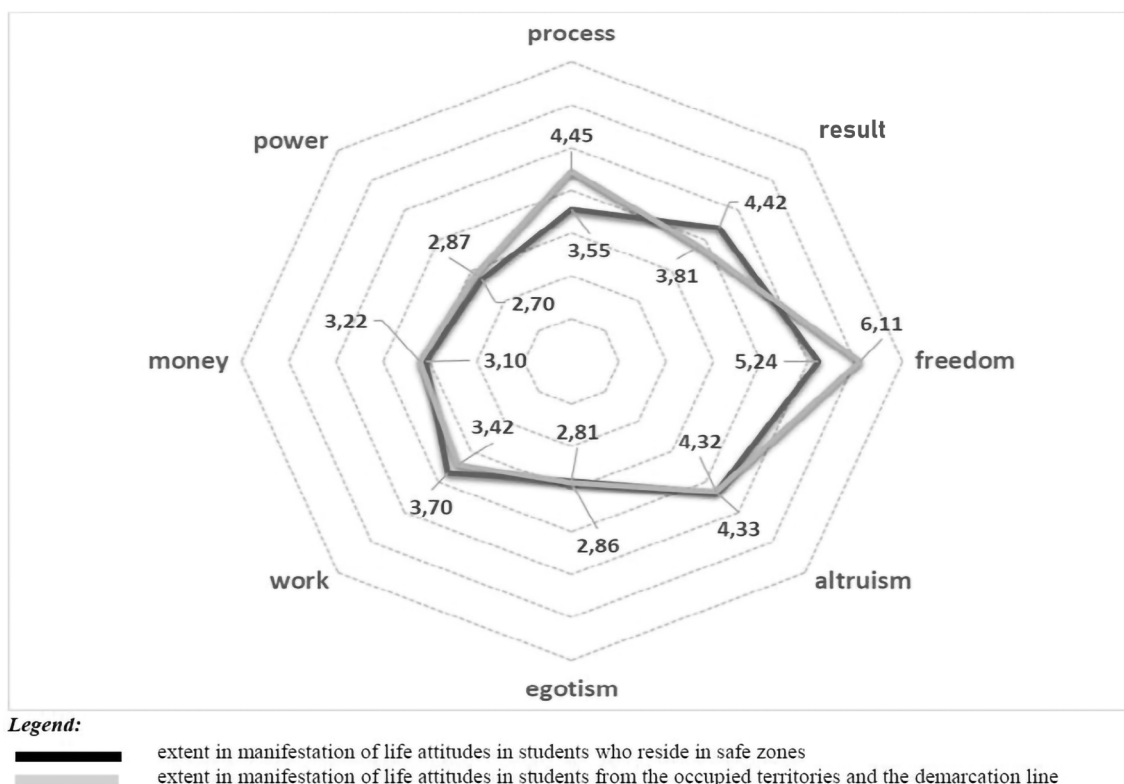
The data obtained attested to the prevalence in students from the occupied territories and the demarcation line of a lower level of social wellbeing indicators compared with those in the students who reside in safe zones ( $U=4515,5$ ,  $z=2,37$ ,  $p=0,02$ ). Besides, they demonstrate lower indicators in the scales of “interest in life” ( $U=4430,5$ ,  $z=2,61$ ,  $p=0,01$ ) and “generalized mood background” ( $U=3356$ ,  $z=4,98$ ,  $p<0,001$ ), which attested to a lesser extent in enthusiasm, optimism, interest in everyday life, and getting pleasure from life demonstrated by them. This means, that the load of adult problems and psychological traumas, the socialization and adaptation problems continue influencing these students. As to the social wellbeing indicators level for students who reside in safe zones, it should be noted that they coincide with those obtained in the research conducted by I. Galyan and dedicated to the study of the structure and determinants of satisfaction with life in pedagogues-to-be [43]. Therefore, special work at HEIs with students from the occupied territories and the demarcation line is needed.

The results of the initial diagnostics of socio-psychological attitudes to “process – result”, “altruism – egoism”, “freedom – power”, “work – money” in the studied groups are presented in figure 1. Thus, in both groups of students the orientation at altruism, work, and freedom prevails. As to the “process – result” life attitudes, the higher indicators of the attitude to process than those to result were demonstrated by students from the occupied territories and the demarcation line. It should be noted that



**Table 1.** Results of initial diagnostics of comparing social wellbeing in the students from the occupied territories and the demarcation line (group II) and the students from safe zones (group I)

Indicator	Rank Sum group I	Rank Sum group II	<i>U</i>	<i>z</i>	<i>p</i> -value	<i>z</i> adjusted	<i>p</i> -value	Valid <i>N</i> group I	Valid <i>N</i> group II
The satisfaction with life level	12179,5	10186,5	4515,5	2,37	0,02	2,37	0,02	105	106
Interest in living	12264,5	10101,5	4430,5	2,56	0,01	2,61	0,01	105	106
Consistency in goals	11187	11179	5508	0,13	0,9	0,13	0,9	105	106
Goals correlation	11117,5	11248,5	5552,5	-0,03	0,98	-0,027	0,98	105	106
Positive self-estimation	10924,5	11441,5	5359,5	-0,46	0,64	-0,47	0,64	105	106
Generalized mood background	13339	9027	3356	4,98	0,000	5,05	0,00	105	106



**Figure 1.** Indicators of life attitudes in students from the occupied territories and the demarcation line and students residing in safe zones

the correspondent attitude is characterized by such negative traits as students' frequent failure to hand in their works in time, their low efficiency, and low academic performance. In students residing in safe zones, on the contrary, higher indicators of the attitude to result were observed. The authors explain this by the fact that the students from safe zones do not have those problems and needs which distract students from the occupied territories and the demarcation line from learning in their everyday life.

In students from the occupied territories and the demarcation line, higher indicators of the attitude to freedom than that to power were observed. In its turn, in students from the safe zones, a similar tendency was observed, but

the attitude to freedom as a need was manifested to a lesser extent, which attests to the need of the students from the occupied territories and the demarcation line in realization of freedom of choice and behavior compared with the students from safe zones, who have a possibility of realizing this need. This conclusion on domination of the attitude to freedom over that to power among the student youth is confirmed by results of other scientists' researches [24, 44].

Verification of all distributions of life attitudes indicators in the studied groups for normality by means of the Shapiro-Wilk and Kolmogorov-Smirnov criteria also revealed that they do not obey the Gauss law. Consequently, non-parametric statistical methods were applied

to confirm significance in the difference between the mentioned indicators in the studied groups. By means of the Mann-Whitney's  $U$ -criterion this difference was statistically confirmed in the indicators of directedness at freedom ( $U=3953$ ;  $z=-3,68$ ,  $p<0,001$ ), process ( $U=4072,5$ ,  $z=-3,41$ ,  $p<0,001$ ) and result ( $U=4599,5$ ,  $z=2,22$ ,  $p<0,03$ ) – table 2, that attested to the correctness of the reached conclusions. Therefore, the life satisfaction level, interest in life, and the general mood background of students from the occupied territories and the demarcation line became the main criteria in the research of transformation of their social wellbeing in the context of their integration into Ukrainian environment, while focus on process, result, and freedom – the criteria of life attitudes transformation.

Attaining the corresponding changes, the essence of which is overcoming the imbalance between the indicators of social wellbeing and life attitudes of students from the occupied territories and the demarcation line as opposed to those living in the safe zone, is possible on condition of conducting the reintegration on the level of a HEI and the community. In this case, the definition of the essence of reintegration in work with students on the level of a relocated HEI is the key one to the authors' research:

Reintegration is uniting of anything that has fallen apart, was disconnected and is restored on new principles, foundations [45]. Thus, a far-reaching goal of reintegrating students through the education system of Ukraine is restoration of territorial, social, economic, and political wholesomeness of the country, overcoming of separation and conflicts. In practice, for a HEI it means priority of educational work, the national idea of Ukraine that are performed along with forming social and economic conditions for internally displaced students, improvement of their life quality.

It is noted in the Recommendations concerning reintegration of the population that suffered from the conflict in Donbas and restoration of the just peace, developed by the International Civil Society Platform "CivilM+" that currently, the Office of the UN High Commissar for the Refugees Affairs and the International Migration Organization consider reintegration process more often in the context of return of displaced persons or refugees. As to Ukraine, it is still impossible to speak about IDPs returning to the places of their previous residence, which is why reintegration can be defined as a process that includes a gradual formation of conditions that enable the population that has suffered from the conflict, to enjoy their social, economic, civil, and political rights. The notion of reintegration supposes elimination of the difference in status and rights between the communities that have suffered from the conflict and the population from the safe zone [46]. This means that national education alone is not enough for successful reintegration of students from the occupied territories and the demarcation line. It should be also sustained with social, economic, political measures, with forming varied conditions for realization of all human rights.

The term of "safe reintegration", which is currently used in the documents related to the conflict in the east

of Ukraine, means a "processes in forming and implementing policies, strategies, and actions of government that are directed at attaining of lasting peace on the basis of restoration of territorial integrity and sovereignty of Ukraine at temporally occupied territories, protection of people's rights, satisfying their socio-humanitarian needs, restoration of democratic institutions' operation, ensuring national unity and social cooperation, preserving and strengthening humanitarian contacts between people who live on the territory of Ukraine controlled by the government and at the temporally occupied territory" [47]. Therefore, this supports the authors' conclusion that along with prioritized national upbringing of students, other measures concerning their successful reintegration are needed as well. Safe reintegration is based on the complex approach to solving this problem.

It should be noted separately, that the applicants are mostly aged 16–17, for whom family is the best precondition of upbringing and development in accordance with the UN Convention on Children's Rights [48]. Therefore, a HEI has to ensure family relations for these children in their reintegration and adaptation to new conditions of life, to form conditions for daily family relationships, and ensure their connection with families and parents for students' successful socialization and development, as well as their parents' reintegration on the territory of Ukraine later on. It is family that gives the feeling of being protected and safety, parents are responsible for fulfilling the children's rights and bear responsibility for them, make decisions concerning their lives and health, etc.

Thus, a HEI influences not only children's and youth's reintegration, but their parents' as well, indirectly, through children, which generally facilitates the dialogue, overcoming conflicts, and reunification of families, children and parents on Ukrainian soil as a long-term goal of a HEI's work.

In the Guidelines on children's reintegration, it is stressed that families should always be in the focus of all reintegration processes and participate in making decisions at each stage of implementing the program. It is necessary to utilize their advantages and remove disadvantages. This is the resilience approach. Also, it is needed to involve competent personnel in work on social protection of children in the reintegration process, provision of services and social guidance, cooperation with other systems that support social norms that prevent discrimination, and permanent monitoring and data gathering [49]. It means in reality, that a relocated HEI becomes in practice a center for reintegrating students into a community, which is a long-term process that includes a complex of actions of specialists from different services, involves resources of organizations, offices and communities into work with students, combines training activities with social work and social protection as conditions of successful educational work and reintegration on its basis. Earlier, only general secondary education institutions became centers for helping families with children in a community under conditions of conflict by international standards [50]. Ukrainian experience attests to the need in such work with students and their families on the base of a HEI. This implements

**Table 2.** Results of initial diagnostics of comparing life attitudes indicators in students from the occupied territories and the demarcation line (group II) and the students from the safe zone (group I)

Life attitude	Rank Sum group I	Rank Sum group II	<i>U</i>	<i>z</i>	<i>p</i> -value	<i>z</i> adjusted	<i>p</i> -value	Valid <i>N</i> group I	Valid <i>N</i> group II
Process	9637,5	12728,5	4072,5	-3,36	0,0008	-3,41	0,006	105	106
Result	12095,5	10270,5	4599,5	2,18	0,0295	2,22	0,027	105	106
Freedom	9518	12848	3953	-3,63	0,0002	-3,68	0,0002	105	106
Altruism	11149,5	11216,5	5545	0,04	0,966	0,04	0,9653	105	106
Egotism	11197	11169	5498	0,15	0,881	0,15	0,8783	105	106
Work	11640	10726	5055	1,15	0,251	1,17	0,2439	105	106
Money	10763	11603	5198	-0,83	0,409	-0,85	0,3975	105	106
Power	11071	11295	5506	-0,13	0,895	-0,13	0,8928	105	106

the idea of the environmental approach through the formation of a student-centered education environment.

The theoretical foundation for students' reintegration at a relocated HEI can therefore be defined as a complex of scientific approaches: the human rights and personality development theory, the sustainable society theory, the safe integration approach, the complex resilience and family-centered approaches (priority of family rights in society and children's rights in a family), the national upbringing theory, the youth participation theory, student-centrism, environmental, competency, multidisciplinary approaches, resource-orientated approach, problem-orientated approach, and social work theories. Therefore, there are numerous multilevel approaches for students' successful reintegration, which enable determining what and how should be done at a relocated HEI.

In the context of reintegration, a HEI begins performing the following new functions in a community concerning students: organizing-and-coordinating, socio-directing, socio-preventive, socio-educative, outreaching (information-explanatory), consultative, of social protection, and supposes influencing emotive, voluntary, intellectual, physical traits of students; it influences their social wellbeing, life attitudes, values and orientations, social ties resting on the system of various pedagogic and social measures [51–54].

In accordance with theoretical foundations and practices of work with the students from the occupied territories and the demarcation line, this activity by a HEI can be viewed as a system of work with a system-forming factor – forming various social conditions at a HEI and community for successful implementation of their right on education and other rights through education, social, and other services in the education process, social work, and social protection in community. These conditions are implemented through special events at a HEI, which can be classified as information-explanatory, socio-educative, psychological, pedagogical, socio-economic, and legal ones. They should be systematic and organizationally coordinated, meet the set goal and tasks.

Correspondently, for a year (February 2019 – January 2020), the mentioned system of work was conducted with students from the occupied territories and the demarcation line. It was implemented through the mentioned

events with active coordination by curators of academic groups, heads of departments, directors of institutes, and the deans of faculties, their deputies for socio-educative work, the university students' social service, students' self-governing bodies, the Culture and Leisure Center, the students' trade union organization of the Luhansk Taras Shevchenko National University, and interaction within the free space of the university "Coworking Centre – Creative University", etc [55–57].

Outreach (information-and-explanatory) events supposed:

- providing true information on the events in the east of Ukraine by curators, directors' and deans' deputies on socio-humanitarian work,
- forming safe behavior on the Internet,
- ensuring the right of the university students on obtaining information in Ukrainian language in social networks, on the Internet, official sites, and pages of the university and faculties,
- creating information content on the university site [58] for involving children and youths from the occupied territories to studying at Ukrainian institutions of general secondary and higher education,
- conducting work with their parents as to their children's future,
- consulting on paperwork for entering a HEI, support of applicants from the occupied territories and the demarcation line by the state, state support for internally displaced persons [58, 59].

Socio-education events consisted of educational extracurricular work, involving student youth in the national-patriotic education system, organizing their leisure and volunteer activities [42]. The national-patriotic education of students was directed at forming national-patriotic attitude, personality identification with their nation, belief in spiritual strengths and future of the country, the will to work for the good of people; assimilating moral and cultural values [40]. In accordance with the Training-and-education program of the national-patriotic upbringing of student youth at the Luhansk Taras Shevchenko National University (LNU), the main directions, by which socio-educative events are organized and conducted are:

- forming national awareness and responsibility for the destiny of Ukraine, bringing up caring attitude to Ukrainian culture,
- strengthening positions of the state language at LNU,
- forming civic responsibility before Ukraine and the society,
- forming a high level of legal culture, respect to the Constitution of Ukraine, laws of Ukraine, state symbols – the Coat of arms, the Flag, the Anthem,
- support of the University’s traditions and forming university patriotism,
- forming in students civic consciousness and responsibility, facilitating development and support of students’ self-government activities,
- forming national-and-cultural traditions of youth in conditions of European integration,
- LNU public organizations’ activity in the sphere of national-patriotic education [59].

Organizing of leisure and volunteer activity is closely related to national-patriotic education and supposed:

- 1) students’ participation in the work of the University Culture and Leisure Center’s clubs;
- 2) preparing and running celebration concert programs, and sports events (“the Autumn marathon of strength and spirit”, “Cossack games”, etc.), theatrical events (the “Great Cossack holiday of Intersession”, “The pancake week”, “The Ukrainian cuisine holiday”, “Dinner party”, “Ukrainian Vechornytsi (evening parties)”, etc.);
- 3) facilitating development of volunteer groups’ activities, work on university and city improvement, involving students in participating in Ukrainian and international cultural-and-historical trips, charity rallies (the local; “Kindness”, “Veterans live next-door”; all-Ukrainian: “Heart to heart”, “To remember. To revive. To preserve”, and others), social, intellectual, and artistic meetings, competitions, and projects (review-competition of the university creative teams with accentuation on national patriotism, the Ukrainian culture week, meetings with well-known native artists, current writers, etc.).

Psychological measures included:

- forming in students of critical thinking and safe behavior, stress-resistance, mechanisms of psychological protection from negative impact of information,
- students’ participation in thematic trainings,
- talks and consultations on personal issues, on finding ways of solving conflict situations,
- individual and team work on overcoming a psychological trauma in students who have suffered it.

In psychological events organizing, students’ social service and students’ self-governing bodies were involved, meetings and talks with specialists in various branches

were held in the University’s free space “Coworking Centre – Creative University”) [57].

Pedagogic measures were directed at:

- orienting students in classes not only at process, but also at getting results from their activities on account of improvement of available resources and optimum organization of their activities,
- taking into account the students’ educational needs and peculiarities in their perceiving and cognitive processing of information obtained,
- formation of key competencies that correspond to the principal kinds of a citizen’s activities, who is capable of flexible change in means and forms of action, building up their own activity principles and strategies, self-development motivation, and creative activity development [60].

Socio-economic measures were as follows:

- protection of students’ rights and interests by the students’ trade union,
- granting students residence in repaired hostels with new furniture, beds, rooms equipped for studying, because living conditions are important for students. Ensuring of adequate social and living conditions is of special importance for a relocated university [61],
- arranging students’ meetings with representatives of the International charity organization “SOS Children’s Villages”,
- organization of mobile brigades’ work at different types of education institutions at the demarcation line,
- organization of assistance to students who need financial help and have health problems [42].

The legal measures supposed delivery of thematic lectures, conferences, information-legal classes within the training courses on “History of Ukraine”, “Political studies”, “Basics of Law” aimed at obtaining knowledge on the role of the Main Law in Ukrainian state-building; the sittings of the LNU clubs (the clubs of the history of Ukraine, of native language enthusiasts, local history, ethnographic, political studies, discussing clubs); the information days dedicated to the Day of Europe, European heritage days at the university, driving students youth’s attention to the issue of preserving European heritage in the broad sense (the cultural, historic, natural, etc.); discussing issues of the essence and role of the EU in present-day world.

In February 2020, the final students’ diagnostics was carried out, results of which, following a comparative analysis, enabled making conclusions as to transformation of social wellbeing and life attitudes in students from the occupied territories and the demarcation line following the implementation of the mentioned reintegration measures in work with them.

In particular, comparing of social wellbeing indicators of students from the occupied territories and the demarcation line, and those who live in safe zones, which at the initial diagnostics stage were lower in the students from the occupied territories (satisfaction with life, interest in



life, general mood background), attested to the absence of such difference between the groups after the experiment (table 3). This attests to the fact that students from the occupied territories and the demarcation line have reached the same level as that of the students residing in the safe zones.

In order to confirm statistical significance of the transformation in the indicators of satisfaction with life, interest in life, and the general mood background in students from the occupied territories and the demarcation line, results by these indicators obtained prior and following the experiment were compared by means of Wilcoxon's  $T$ -criterion, and statistical significance of the attained results was confirmed: the satisfaction with life level  $T=275,5$ ;  $z=6,07$ ;  $p<0,001$ ; interest in life  $T=406$ ;  $z=3,2$ ;  $p=0,001$ ; the general mood background  $T=88,5$ ;  $z=5,63$ ;  $p<0,001$ .

Also, in the mentioned group transformation in life attitudes took place in the scale of "process – result". These indicators levelled with those of the students who lived in safe zones, which is confirmed with results of statistical data procession by Mann-Whitney's  $U$ -criterion. The obtained data attested to the absence of difference between life needs of students from the occupied territories and the demarcation line and those residing in safe zones (table 4). In order to confirm statistical significance of transformational changes in the indicators of life attitudes to "process", "result", and "freedom" in students from the occupied territories and the demarcation line, the authors compared these attitudes' indicators obtained prior and following the experimental influencing them by means of the Wilcoxon's  $T$ -criterion, which confirmed the corresponding transformations: "process"  $T=44,5$ ,  $z=5,002$ ,  $p<0,001$ ; "result"  $T=82$ ;  $z=4,82$ ,  $p<0,001$ ; "freedom"  $T=46$ ,  $z=5,93$ ,  $p<0,001$ .

Results obtained by the authors coincide with those of the research conducted by S. Savchenko in 2018 concerning the hierarchy of value orientations in the youth from Donbas, which also attested to a raise in the level of attitude to life, freedom, humanism, etc. [25], but the corresponding indicators in the students from the occupied territories and the demarcation line and students from safe zones were not compared in this research. Neither were compared the indicators in these groups concerning their social wellbeing and focus on certain life attitudes.

Therefore, the implementing of the described reintegration measures in a HEI work with students from the occupied territory and the demarcation line facilitated transformational changes concerning their social wellbeing and certain life attitudes and, correspondently, positive changes on the road to their integration into both students' environment of a relocated higher education institution and the Ukrainian space in general.

## 4 Conclusions

1. The research of the state of social wellbeing and life attitudes in students from the east of Ukraine and the demarcation line conducted by the authors of this article attests to the fact that at the stage of students' enrollment to a relocated higher education

institution there are certain differences in these indicators compared with students who reside in safe zone. The students in question can be characterized as having lower indicators of satisfaction with life level, interest in life and the general mood background, as well as lower indicators of orientation at process than at result, and higher indicators of the need in exercising the freedom of their choice and behavior, although it should be noted that the freedom attitudes indicators were the highest compared with other life attitudes, which is a characteristic attribute of this period in a person's life.

2. The authors define reintegration of students from the occupied areas and the demarcation line under conditions of a relocated HEI as a long-term process which includes a complex of actions by specialists from different services and subunits of the HEI targeted at forming various conditions for implementing the basic rights and freedoms of students, and combines its activity with social work and social protection, life quality improvement, ensuring students' ties with their families, prioritizes the Ukrainian national idea in its work, involves other organizations', offices' and community's resources in reintegration work for achievement of the common and far-reaching goal of restoring territorial, economic, social, and political unity of the country and population, of overcoming disunity and conflicts. The theoretical foundations of such reintegration is a complex of scientific approaches: the theory of human rights and personality development, the sustainable society theory, the safe integration approach, the complex, the resilience, the family-centered approaches, the national education theory, the theory of youth participation, student-centrism, the environmental, the resource-oriented, the competency, the multidisciplinary approaches, social work approaches, and the problem-oriented approach. Therefore, there are multilevel and different sciences' approaches to students' successful reintegration at a relocated HEI and in a new community.
3. The efficient measures of integrating the students from the occupied areas and the demarcation line zone in a relocated HEI were: outreach (information-and-explanatory), socio-educational, psychological, pedagogical, socio-economic, and legal ones, which should be systematic, organizationally coordinated, correspond to the set goal, and be implemented in a complex, with the national education as a priority.
4. The use of the described measures under conditions of a relocated HEI is efficient because it ensures transformational changes related to overcoming the imbalance between the social wellbeing indicators (satisfaction with life level, interest in life, general mood background) and life attitudes (focus on process, result, freedom) in students from the occupied

**Table 3.** Results of the final diagnostics of comparing social wellbeing indicators in students from the occupied territories and the demarcation line (group II) and students from safe zones (group I)

Indicator	Rank Sum group I	Rank Sum group II	<i>U</i>	<i>z</i>	<i>p</i> -value	<i>z</i> adjusted	<i>p</i> -value	Valid <i>N</i> group I	Valid <i>N</i> group II
Satisfaction with life level	11061,5	11304,5	5496,5	-0,15	0,88	-0,15	0,88	105	106
Interest in life	11227,5	11138,5	5467,5	0,22	0,83	0,22	0,82	105	106
General mood background	11294,5	11071,5	5400,5	0,37	0,71	0,38	0,7	105	106

**Table 4.** Results of the final diagnostics of comparing the life attitudes indicators in students from the occupied territories and the demarcation line (group II) and students from safe zone (group I)

Life attitude	Rank Sum group I	Rank Sum group II	<i>U</i>	<i>z</i>	<i>p</i> -value	<i>z</i> adjusted	<i>p</i> -value	Valid <i>N</i> group I	Valid <i>N</i> group II
Process	10959,5	11406,5	5394,5	-0,38	0,7	-0,39	0,69	105	106
Result	10928,5	11437,5	5363,5	-0,45	0,65	-0,46	0,64	105	106
Freedom	10868	11498	5303	-0,59	0,56	-0,6	0,55	105	106
Altruism	11179,5	11186,5	5505,5	0,11	0,91	0,11	0,91	105	106
Egotism	11495	10871	5200	0,82	0,4	0,84	0,5	105	106
Work	10670,5	11695,5	5105,5	-1,03	0,3	-1,04	0,29	105	106
Money	11515	10851	5180	0,87	0,4	0,89	0,37	105	106
Power	11575,5	10790,5	5119,5	1	0,3	1,03	0,3	105	106

territories and the demarcation line versus those residing in the safe zone, which facilitates reintegration of students from the occupied territories and the demarcation line into student environment of a relocated higher education institution and the Ukrainian space.

The authors consider organizing further work in studying the perspectives of youth concerning future employment and their activity and initiative development in terms of communities' evolution in the east of Ukraine.

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## The development of socio-communicative competence of future trainers of higher education establishments in the course of master's degree acquiring

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**Abstract.** The article identifies one of the components of professional competence, social and communicative competence – the quality of a trainers of higher education, which is defined as complex integrative professional-personal formation, which determines the electiveness of interpersonal and professional interaction, allows a specialist to orient in any professional and social situation, to evaluate it adequately, to make the right decisions and achieve set goals and provides a pedagogue with personal comfort, professional electiveness and social demand in all spheres of life. The following structural components of socio-communicative competence of higher education establishment teachers are identified: motivation-valuable, cognitive, operational-active, personal, as well as a set of criteria and their indicators: motivational (presence of motivation to achieve, determination to interact, necessity in communication, self-actualization); cognitive (completeness and strength of assimilation of socio-communicative knowledge); active the level of mastery of skills (speech, nonverbal, interactive, social, information and communication); personal (social intellect, ability to empathize and reflexivity), which correlate with specified components of socio-communicative competence of higher education establishment trainers. The dissertation defined the levels of development of investigated competence (low, acceptable and high) and revealed their content. Despite the variety of solutions for its development, the higher education system needs to find new ways in this direction. The complex of education-methodological materials for HEE trainers were developed in regard to the development of the future trainers of higher education establishment in the process of Master's degree acquiring, which contains the bank of theoretical and practical lessons, educational cases, projects, exercises, trainings, role and business games; selected and adapted package of diagnostic materials for defining the level of development of socio-communicative competence of future trainers of HEE; and developed the special course program, "Socio-communicative competence of a trainer of higher education establishment". The article presents the results of an experimental study of the level of formation of social and communicative competence of trainers of higher education establishment.

### 1 Introduction

The urgency of the study is due to modern deep and rapid socio-economic, political, innovation and education transformations in the life of Ukraine, as the country focuses on integration with the civilized world community. Regarding the problems of education policy, the main tendencies are these: radical reform that acquires a new meaning; approximation to European standards; coordination of the market for educational services and the labor market; implementation of initiatives of the European Higher Education Area; and expansion of communication space which leads to a growing need for competent professionals in all spheres of human life.

Taking into account the above said, there is an urgent need to prepare future trainers of a new generation

of higher education, in order to meet modern requirements of employers, to be competent in social interaction with both individuals and social institutions, to realize their own needs and goals by building partnerships with others, matching their expectations, needs, effectively interacting with the internal professional-communicative environment and the external social environment of society as a result of the presence of socio-communicative knowledge and skills, which are professionally important communicative qualities. These factors are a large part of the social order for the system of professional pedagogical education, which has a clearly defined legal framework: the National Doctrine of Education in Ukraine in the 21st century [1], the National Strategy for Education in Ukraine until the year 2021 [2], the Law of Ukraine "On Higher Education" [3], which provide measures for a trainer of higher education establishment (hereinafter – HEE) to become a guarantee of high quality education, which would change the meaning and nature of social, professional communication in accordance with the requirements of the renewed higher education establishment.

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Various aspects of the problem of socio-communicative competence have attracted attention of many researchers. Scientists studied the structure and content of socio-communicative competence (L. Anfalova [4], B. Burlison [5], S. Vdovina [6], J. Greene [5], O. Kovaleva [7], N. Levus [8], L. Newell [9], S. Olsen [9], V. Pomiluyko [10], O. Popova [11], O. Timofeeva [12], T. Tomenko [13], J. Fruktova [14], C. Hart [9], A. Tsvetkova [6], O. Shumilova [15], etc.), the peculiarities of social competence (G. Gedviliene [16], S. Gerviene [16], H. Han [17], K. Kemple [17], A. Pasvenskiene [16], S. Ziziene [16], T. Tulpa [18], etc.), especially, the competence of trainers of higher education (D. Gubareva [19], M. Matishak [20], etc.) and communicative competence (S. Saleh [21], L. Tarvin [22], N. Yuriychuk [23], etc.).

The issue of professional teaching of future trainers of higher education establishments in the course of Master's degree acquiring is studied by researchers in the following different areas: organization of Master's degree acquiring of future trainers of higher education establishment to form their potential for professional self-development (R. Tsokur [24]); pedagogical training of Master's degree students on conditions of degree education (S. Vitvytska [25]); training higher education professionals for teaching in the Internet and after Covid-19 crisis (C. Rapanta, L. Botturi, P. Goodyear, L. Guàrdia & M. Koole [26]); development of the system of trainers' teaching in higher education establishment (Y. Sorokopud [27]); teaching of future trainers of higher education establishment for pedagogical activity (O. Momot [28], K. Vlasenko [29]); theoretical substantiation and experimental verification of organization and pedagogical conditions to create pedagogical culture of the future trainers of higher education establishment (S. Chorna [30]); formation of professionalism of future trainers of higher education establishment in pedagogy in the process of professional training (I. Mazur [31]), the development of relational competencies of the future trainers of higher education establishment (N. Dută, E. Răfăila [32]) and others.

With this in mind, the aim of the article is to reveal the essence, structure and indicators of development of socio-communicative competence of future trainers of higher education establishment, and to develop, substantiate and experimentally test the technology of development of socio-communicative competence of future trainers in higher education institutions.

## 2 Research methods

To achieve the goal of the article, a set of qualitative and quantitative research methods is given: *theoretical* – analysis, summarizing and systematization of scientific statements for developing theoretical foundations of the development of socio-communicative competence of future trainers of higher education establishment in the process of Master's degree acquiring; *empirical*: the method of "Assessment of the need to achieve", the method of "Determining the orientation of the individual" (B. Bass), method "The Necessity for communication" (Y. Orlov), evaluation scale method "Self-actualization test" (Y. Alyoshin,

L. Gozman), surveys, analytical maps to level the development of socio-communicative skills, method of determining the level, method of reflectivity (A. Karpov, V. Ponomareva), methods of diagnosis of social intelligence (N. Hall), methods of diagnosis of the level of empathy (V. Boyko); pedagogical experiments (ascertaining, formative, control) in order to determine the effectiveness of the implementation of technology for the development of socio-communicative competence of future trainers of higher education establishments in the course of Master's degree acquiring, *methods of mathematical statistics* to determine the statistical significance of the results obtained during experimental work.

## 3 Results and discussion

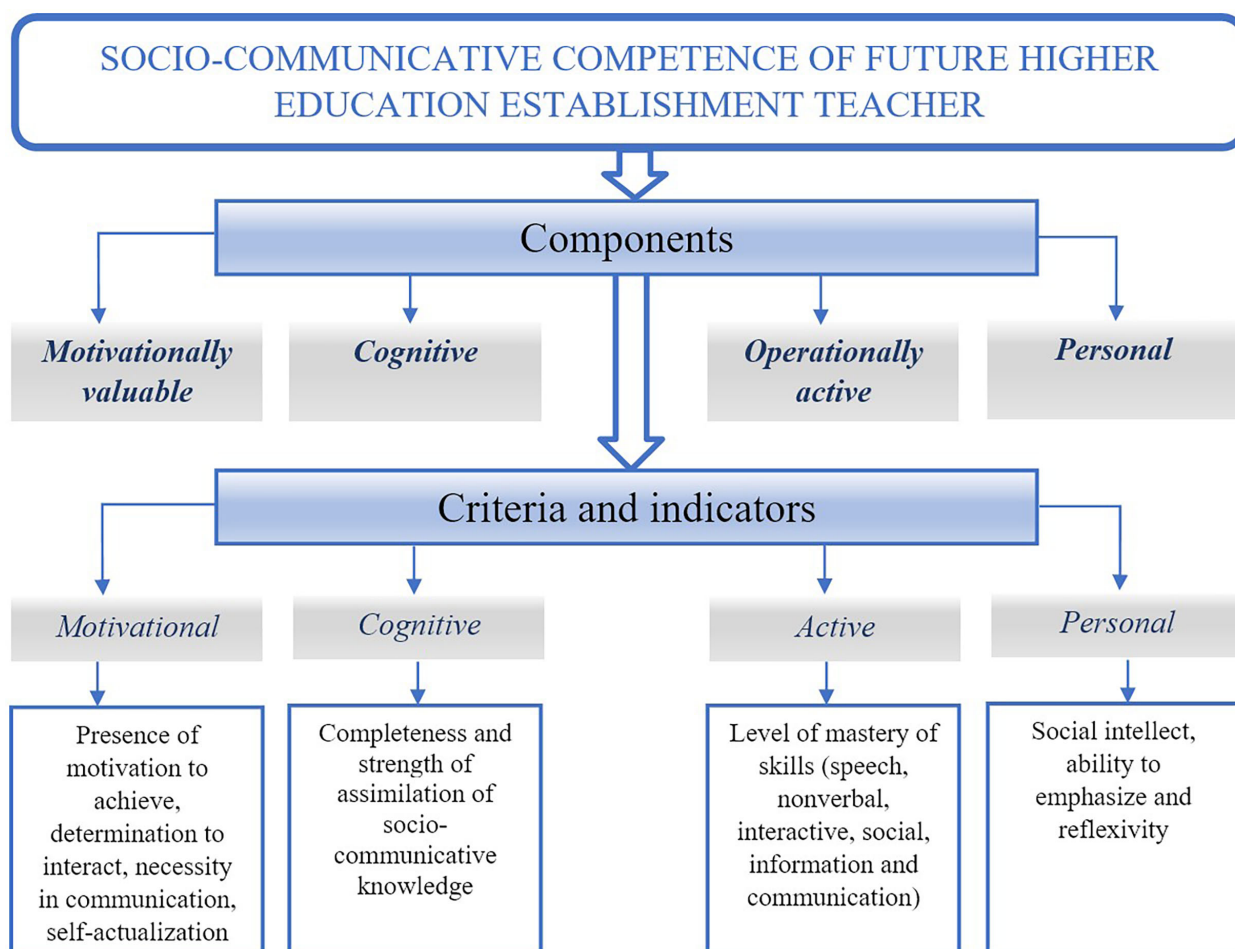
The socio-communicative competence of a future trainer of higher education establishments is considered to be stable, complete and integral to personal development, which allows a pedagogue to effectively interact with an internal professional-communicative environment and an external social environment of a society to perform socio-communicative activity by acquiring socio-communicative knowledge and skills (such as speech, non-verbal, interactive, social and information-communicational), important professional communicative qualities (such as intellect, empathy and reflexivity).

The presence of socio-communicative competence for a trainer of higher education establishment and other competences, such as complex integrative professional-personal formation, which determines the effectiveness of interpersonal and professional interaction, allows a specialist to orient in any professional and social situation, to evaluate it adequately, to make the right decisions and achieve set goals and provides a pedagogue with personal comfort, professional effectiveness and social demand in all spheres of life.

This phenomenon is cross-curricular (formed and operates in several related fields and has an interdisciplinary nature, which enables solving meta-tasks) and it is multi-functional, as mastering this competence allows the graduate to solve various problems in professional, social and personal life.

Under the development of socio-communicative competence of future trainers of higher education establishments in the course of Master's degree acquiring we understand the purposeful process of systematic accumulation in its content of positive quantitative and qualitative changes that allow us to interact effectively with the internal professional and communicative environment and the external social environment of society, to carry out social and communicative activities, notably the establishment and development of interpersonal contacts between a trainer and social subjects (students, colleagues, professionals, employers, etc.), which also includes an information exchange, modeling a common strategy of interaction and achieving the goal through the management of social communication processes.

Based on the analysis of works of S. Vdovina, A. Tsvetkova [6], O. Kovaleva [7], O. Pryamikova [33],



**Figure 1.** The structure of socio-communicative competence of future trainers of higher education establishments in the course of Master’s degree acquiring

T. Tomenko [13], the following structural components of socio-communicative competence of higher education establishment teachers are identified: motivation-valuable, cognitive, operational-active, personal, as well as a set of criteria and their indicators: motivational (presence of motivation to achieve, determination to interact, necessity in communication, self-actualization); cognitive (completeness and strength of assimilation of socio-communicative knowledge); active the level of mastery of skills (speech, nonverbal, interactive, social, information and communication); personal (social intellect, ability to empathize and reflexivity), which correlate with specified components of socio-communicative competence of higher education establishment trainers. The dissertation defined the levels of development of investigated competence (low, acceptable and high) and revealed their content.

In order to develop the socio-communicative competence of Master’s degree students, we formulated theoretical techniques of development of socio-communicative competence of future trainers of higher education establishments in the course of Master’s degree acquiring, which contains the following steps: conceptual, motivational-stimulation, content-processional, practical and diagnostic-correctional.

The conceptual stage covers finding the aim of technique, particularly the development of socio-communicative competence of future trainers of higher education establishments in the course of Master’s degree acquiring and encircling the following tasks: stimulation and professional motivation of Master’s degree students, mastering socio-communicative knowledge by Master’s degree students, honing socio-communicative skills (speech, non-verbal, communicative, interactive, social and information-communicative) required for performing socio-communicative activity; enriching personal experience of Master’s degree students in productive socio-communicative activity, formulating a personal-value attitude for self-improvement of socio-communicative competence; formulating methodological approaches (systematic, active, competent, andragogical, contextual, personally oriented, participative, synergetic); defining principles of studies (subjective, communicative collaboration and dialogue, increasing the number of social development mechanisms, worldview pluralism, differentiation, self-improvement and mutual improvement, competent “upgrading” and professional mobility); carrying out preliminary diagnostics of a development level of Master’s degree students’ socio-communicative

competence and defining an educational and methodical seminar-practicum for professors which prepare the future teachers of HEE according to the program 011 Educational, Pedagogical sciences.

The *motivation-stimulating stage* of the technique orients towards the following: formation on the part of Master's degree students of a personal understanding of socio-communicative activity; self-improvement of personal confidence level, values and goals of communication; deep emotional attitude towards the world, people and themselves.

The essence of *contextual-procedural stage of techniques*, which is aimed at the content transformation of the education process in the direction of mastering socio-communicative knowledge and skills of Master's degree students. The foundation of this stage is based on a renewed list of disciplines: "Psychology of higher institution", "Modern techniques of organization of higher establishment educational process", "Professional pedagogical communication", "Crises and deformations of a trainer's professional development of higher education establishment"; implementation of the following methods of teaching: dialogue-discussion (dispute, debates, discussion, brainstorming, round-table, symposium); situational (problematic situations, case method, communicative situational tasks). The key role is allocated to strategies ("Reciprocal teaching" by Brown and Palinscar, "Zigzag", "Reverse zigzag" by T. Hedeem), "Round table writing", "Think in pairs") and techniques ("aquarium", "hot chair", "puzzle", "puzzle-2", "team education", brainstorming, "Delbeck method", "synaptic method", "mind mapping", collaborative education and coaching methods.

Implementation of professionally oriented activities involving Master's degree students in active communication and interaction allows them first unconsciously and then consciously to develop ideas about the norms, values of professional teaching, including social communication activities, behaviors and their own participation in it. This adds a communicative, active, interactive character to the process of professional teaching of higher education establishment trainers.

It provides a harmonic combination of lecture (interactive lecture, lecture-discussion, briefing lecture, problem-based lecture), seminars (Socratic seminar, intervision seminar, seminar for defending projects and individual artistic tasks) and practice-based lessons (training).

Emphasis is placed on coaching methods: the method of specific situations (improvement of knowledge is possible only through a comprehensive consideration, study and discussion of specific pedagogical situations); method of emotional stimulation of learning (based on the principle of formation and increase of cognitive interest of Master's degree students through the creation of positive emotions to the work of a trainer, motivation for the educational process and positive motivation for pedagogical activity of future trainer of HEE). The method of creating a situation of cognitive discussion (activation of learning through the statement "truth is born in discussion", and the search for truth is always of interest); "mosaic" method (the method of dividing responsibilities in a group of Master's degree

students based on their independence in the process of distribution their responsibility for it).

The most important role is assigned to the developed author's special course "Socio-communicative competence of a higher education establishment trainer". This course aims to provide general theoretical preparation of the future trainers of HEE in the field of professional socio-communicative activity and development of components of their social and communicative competence.

The program of the special course is designed for three credits (90 hours): lectures – 10 hours, seminars – 12 hours, practical classes – 14 hours, individual work – 8 hours, independent work – 46 hours.

The content of the special course includes two main modules: "Socio-communicative competence as a basis of professional competence of a higher education institution trainer" and "Socio-communicative competence of a higher education institution trainer: methods, means and technologies of formation".

The special course program provides a harmonic combination of *lectures* (interactive lecture, lecture-discussion, briefing lecture, problem-based lecture), *seminars* (interactive seminar, intervision seminar, Socratic seminar, seminar for defending projects and individual artistic tasks) and practice-based lessons using interactive methods of teaching: *dialogue-discussion* (dispute, debates, discussion, 'brainstorming', round-table, case-method ('Help and do not cause inconvenience', 'Look at the ceiling', 'Brilliant cartoonist', 'Fire on the host'); *games* (business, roleplay 'Negotiation', 'Business conversation'), socio-psychological games 'Gelactions', 'Shipwreck'); *training* ('Effective interaction as a means of conflict prevention'). Considerable attention is paid to the exercises ('Being a trainer is (means)...', 'Understanding the image who I am', 'Carousel', 'Self-presentation', 'What are we like?', 'Influence of emotional states on relationships', 'Prohibition to say 'no', 'Collection of phrases for contact', 'Constructive style of behavior in conflict', etc.). In the course of training, tutoring of Master's degree students should be organized and compulsory.

During the development of socio-communicative competence of the future trainers of HEE the attention is focused on the need for active participation of Master's degree students in various forms of extracurricular activities, the main purpose of which is to set up conditions for creative intellectual development of graduate students in their free time; preparation of graduate students for interaction in the social and professional environment; introduction of innovative forms and methods of organization such a training. It is proved that extracurricular work should be professionally oriented to allow Master's degree students to gain initial practical experience, to form skills of independent action, to find their own professional style of interaction. In the study, the preference was given to training that helped graduate students to learn, to get the opportunity to feel like a full-fledged trainer, to be more interested in professional growth and be confident that they can grow professionally under the condition of successful activities.

The *practical stage* involves Master's degree students in the practical socio-communicative activities of a trainer,



analytical and evaluative, exploratory and practical activities that all ensure the formation of a reflexive position in graduates; participation in the competition “The best future trainer of higher education establishment”, the implementation of practical teaching activities; involvement in master classes; compiling a portfolio.

The practical stage is implemented during the assistant practice (3 credits), which is an important component of the educational process and aims at teaching graduates to creatively apply their new teaching theoretical knowledge and practical skills acquired in the study of psychological, pedagogical and special disciplines, to promote the development of future trainers of higher education institutions to have a steady interest in pedagogical activity. The specificity of the practical activity of graduate students is more identified with the pedagogical activities of HEE trainer, meanwhile the practice is carried out in conditions adequate to the conditions of future independent pedagogical activity. It is important that the activity of the Master’s degree students during the internship is characterized by the same variety of functions as the work of a trainer.

During the internship, graduate students must take part in a master-class session. Their implementation provides practical skills in the application of various methods, techniques and technologies of teaching in order to increase the level of pedagogical skills, exchange of pedagogical experience, involvement in new areas of knowledge, expanding worldview [34, 35].

The *diagnosis-resultative stage* provides control, self-analysis, correction of imperfections in the process of development of the researched competence; diagnostics of the final level of development of socio-communicative competence of future trainers of higher education institutions. Diagnosis becomes a means of including graduate students in correctional work on themselves, their own qualities, behavior and self-diagnosis, which allows them to identify behavioral and personal complexes, more constructively formulate their own problems, the essence of their impact on interaction in the pedagogical process.

The experimental study was conducted in the following stages: ascertaining, forming and controlling.

The ascertaining stage of the experimental work was aimed at: studying and analyzing the state of the research problem; formulation of goals and objectives; establishment of the quantitative and qualitative composition of the participants of the experiment (scientific and pedagogical workers, curators of academic groups, Master’s degree students of the specialty 011 Educational, pedagogical sciences); primary diagnostics in order to obtain initial data on the level of development of social and communicative competence of Master’s degree students.

The forming stage of the experiment involved the implementation of experimental testing of the hypothesis, the practical implementation of the developed and theoretically grounded technology for the development of social and communicative competence of future trainers of higher education institutions in the process of Master’s training. Empirical data were collected at Alfred Nobel University, Donbas State Pedagogical University, Classical Private University (Zaporizhzhya), Mykhailo Os-

trogradsky National University of Kremenchug (during 2017–2020), 17 professors of the universities mentioned above and 194 Master’s degree students who are obtaining second level (Master’s degree) in the educational-professional program Pedagogy of higher education establishment in specialty 011 Educational, pedagogical sciences participated in the experiment. They were divided into two groups: experimental – 98 people; controlling – 96 people (worked on the traditional curriculum), as well as 17 higher education trainers of these institutions of higher education.

The controlling stage of the experiment included: monitoring the results of the experimental study; description of the course and results of the study; mathematical and statistical data processing; expert evaluations; registration of results of scientific search, definition of prospects of the further researches.

The results on the dynamics of changes in indicators of the levels of development of the components of socio-communicative competence of Master’s degree students of the control and experimental groups are given in table 1.

Comparison of data on the level of development of the components of social-communicative competence of Master’s degree students of the experimental and control groups shows significant positive changes at all levels that occurred during the formative stage of the experiment.

Analyzing the data on the levels of development of the motivationally valuable criterion of socio-communicative competence of graduate students (see table 1), it should be noted that in two years in the control group there were some changes. However, the dynamics was insignificant (+2.0%). Some positive changes were found in graduate students who had a low level of development of motivationally valuable criteria of socio-communicative competence (from 40,7 to 34,4%). These results regarding minor changes in the control group indicate a lack of purposeful work on the development of socio-communicative competence of Master’s degree students. According to the results fixed in the experimental group, we can say that after the formative stage of the experiment in the level of development of the motivationally valuable criterion of socio-communicative competence there are significant positive changes. Indicators of the motivationally valuable criterion were: for high level Master’s degree students +18,4%, acceptable level +8,1%, low level +26,5%. We believe in the effectiveness of our chosen methods and techniques of motivation and stimulating the educational activities of graduate students, which included the inclusion of emotionally rich and professionally oriented material, meetings and round tables with leading scientific and pedagogical staff of HEE. Exercises and methods of coaching were developed and tested, the implementation of which ensured the growth of students’ cognitive interest in the work of a future trainer of higher education establishments and positive motivation for future pedagogical activity.

Regarding the dynamics of the levels of development of cognitive criterion of socio-communicative competence of Master’s degree students, the results obtained indicate rapid positive changes. Thus, after the formation phase of the experiment in the experimental group, the number

**Table 1.** Dynamics of levels' indicators of socio-communicative competence development of Master's degree students in control and experimental groups

Level	Group			
	Control group (96 students)		Experimental group (98 students)	
	Experiment stage			
	Statement	Control	Statement	Control
Criterion of socio-communicative competence				
<b>Motivationally valuable</b>				
High	20,8	22,9	20,4	38,8
Acceptable	38,5	42,7	42,9	51,0
Low	40,7	34,4	36,7	10,2
<b>Cognitive</b>				
High	25,0	25,9	22,4	38,8
Acceptable	29,2	33,4	29,6	46,9
Low	45,8	40,7	48,0	14,3
<b>Operationally active</b>				
High	21,9	22,9	19,4	39,8
Acceptable	35,4	38,5	38,8	46,9
Low	42,7	38,6	41,8	13,3
<b>Personal</b>				
High	21,9	22,9	19,4	36,7
Acceptable	31,3	33,4	33,7	52,1
Low	46,8	43,7	46,9	11,2

of graduate students has rapidly increased, whose performance is now identified at the high level criterion (from 22,4% to 38,8%). It is increased by 16,4%. Qualitative analysis of the results showed that these Master's degree students have stable views on the socio-communicative activities of the future trainers of HEE, which requires a constant self-improvement. They have obtained strong, deep and effective knowledge of the following: the essence of socio-communicative competence of a trainer, their personal structure; social interaction strategies and communication strategies; methods of conflict prevention and regulation in the educational environment; methods and means of formation of socio-communicative competence of the trainers and their implementation of direct and indirect socio-communicative activity. We have to state that the number of low-level criterion among Master's degree students decreased significantly (from 48,0% to 14,3%). It is increased by 33,7%.

Regarding the data of the control group, it can be asserted that there have been some changes, but not significant: high level Master's degree students changed from 25,0% to 25,9%, acceptable – from 29,2% to 33,4%, low – from 45,8% to 40,7%. The detected increase was: +0,9%; +4,2%; -5,1%. These results indicate that an effective technology that was aimed at the development of socio-communicative competence of the future trainers of HEE in the process of Master's degree acquiring was properly chosen.

Significant changes have taken place in the level of development of the operationally active criterion. Diagnosis showed that in the control group, if the number of Master's degree students with a high level is 22,9% (compared to 21,9%), then in the experimental – 39,8% (compared to 19,4%). It is increased accordingly (+1% and

+20,4%). Indicators of the low level of development of the operationally active criterion among Master's degree students have dropped significantly. In the experimental group, there was an increase by 28,5% (-4,1% in the control group). The changes occurred at an acceptable level: in the experimental group (+20,4%), and in the control group (+3,1%). We believe that it was expedient to introduce the educational process of the author's special course "Socio-communicative competence of a trainer of higher education establishment", interactive seminars, discussion seminars, Socratic seminar, seminars-defense of projects, seminars 'Debriefing', 'Professor versus Master's degree student', seminar 'Dispute in the rows', practical classes with the use of exercises, interactive teaching methods: dialogue-discussion, game, training, situational (case method); strategies and tactics of collaborative learning; types of group, in pairs, individual work; various forms of extracurricular activities.

Furthermore, we have to admit that the indicators of the personal criterion have also changed significantly. In the experimental group, noticeable positive changes occurred at all levels: high level Master's degree students – from 19,4% to 36,7% (increased by 17,3%); acceptable level – from 33,7% to 52,1% (increased by 18,4%); low level – from 46,9% to 11,2% (decreased by 35,7%). In the control (regular) group, the changes were insignificant: high level Master's degree students – from 21,9% to 22,9% (increased by +1,0%); acceptable level – from 31,3% to 33,4% (increased by +2,41%); low level – from 46,8% to 43,7% (decreased by 3,1%).

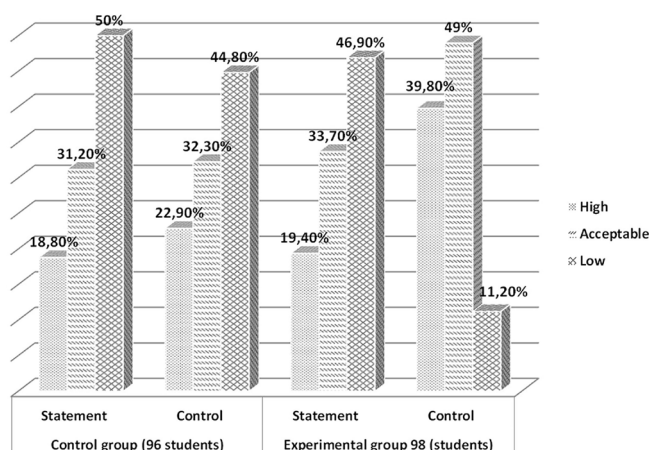
Substantiation of the conclusions and verification of statistical differences of Master's degree students of control and experimental groups were carried out using Pearson's chi-squared distribution test ( $\chi^2$ ).

**Table 2.** The results of calculation of  $\chi^2_{exp}$  and  $\chi^2_{ctrl}$  for the criteria of socio-communicative competence of Master's degree students in Experimental group (EG) and Control group (CG) at statement and control stage of the experiment

Criterion	Experiment stage			
	Statement		Control	
	$\chi^2_{exp}$	$\chi^2_{ctrl}$	$\chi^2_{exp}$	$\chi^2_{ctrl}$
Motivationally valuable	0,48	5,99	<b>16,25</b>	<b>5,99</b>
Cognitive	0,29		<b>15,73</b>	
Operationally active	0,25		<b>16,10</b>	
Personal	0,18		<b>23,92</b>	

**Table 3.** Dynamics of indicators of levels of the development of socio-communicative competence of Master's degree students in Control group (CG) and Experimental group (EG)

Level	Group			
	CG (96 students)		EG (98 students)	
	Experiment stage			
	Statement	Control	Statement	Control
High	18,8	22,9	19,4	39,8
Acceptable	31,2	32,3	33,7	49,0
Low	50,0	44,8	46,9	11,2



**Figure 2.** Dynamics of indicators of levels of the development of socio-communicative competence of Master's degree students (%)

At the end of the formative stage of the experiment, a conducted study was aimed at determining the dynamics of levels of the development of socio-communicative competence of Master's degree students in the studied groups (table 3, figure 2).

Comparing the results obtained at the control stage of the experiment, we have to state that after the formative stage of the study in the experimental group we see a rapid increase in the number of graduate students, who correlate with a high level: the percentage of Master's degree students in the experimental group with high level performance is increased from 19,4% to 39,8%. The number of the future trainers of HEE (Master's degree students), who showed a low level performance in the beginning of the experiment, is decreased significantly at the end of it

(from 46,9% to 11,2%). In the control (or regular) group there were positive, but insignificant changes: high level of Master's degree students is changed – from 18,8% to 22,9%, acceptable level – from 31,2% to 32,3%, low level – from 50,0% to 44,8%.

In the experimental group, the difference, before and after the experiment, was found to be statistically significant ( $\chi^2_{emp} = 375.35 > \chi^2_{critical} = 5.99$ ), in comparison to the control group, where the difference was statistically insignificant ( $\chi^2_{emp} = 3.36 < \chi^2_{critical} = 5.9$ ). The obtained results allow us to conclude that there is a significant difference between the results of the control and experimental groups (with a probability of 95%).

Qualitative analysis of the results obtained in the study shows that the implementation of the technology for the development of socio-communicative competence of the future trainers of HEE in the process of Master's degree acquiring has led to significant positive changes in the phenomenon of the educational process. This allows us to state that the process of development of socio-communicative competence of the future trainers of higher education establishments has taken place, and the declared goal of the study has been successfully achieved.

## 4 Conclusions and prospects for further research

The introduction of technology for future trainers of higher education establishments in the process of Master's degree acquiring, based on the study of scientific research of foreign and domestic scientists on the problem raised in the study, the improved content, methods (dialogue-discussion, game, training, situational learning) and forms of education (lectures, practical and seminar classes, extracurricular activities, practice), aimed at the development of motivational-value, cognitive, operational-activity, personal components of social and communicative competence of future trainers of higher education establishments in the process of Master's degree acquiring are substantiated in the article.

The topicality of the study due to the modernization of socio-economic, political, innovation and educational spheres of Ukrainian society, which requires the introduction of new approaches to shaping the personality of future trainer of higher education, who must be ready for social interaction is revealed.

The analysis of the scientific source base gave grounds to clarify the essence of the key concept of the study: "social and communicative competence of future trainers of higher education establishment". We interpret this competence as a stable, holistic, integrative formation of personality, which allows the trainers to interact effectively with the internal professional and communicative environment and the external environment of society, to carry out social and communicative activities through the acquisition of social and communicative knowledge and speech, non-verbal, interactive, social, informative and communicative skills, professionally important communicative qualities (social intelligence, ability to empathy, reflexivity).

The experimental method confirms the importance of focusing on the four components of social and communicative competence of future trainers of higher education establishments.

The following structural components of the studied competence are substantiated: motivational-value, cognitive, operational-activity, personal components, as well as a set of criteria and their indicators, motivational component (presence of achievement motivation, focus on interaction, communication needs, self-actualization); cognitive component (completeness and strength of assimilation of social and communicative knowledge); activity component (level of mastering speech, nonverbal, interactive, social, information and communication skills); personal component (social intelligence, ability to empathy, reflexivity).

The effectiveness of the development technology of social and communicative competence of future trainers of higher education establishments in the process of Master's degree acquiring is theoretically substantiated. It is proved that the acquiring process contains the following stages: conceptual, motivational-stimulating, content-procedural, practical, diagnostic-corrective.

According to the results of the controlling stage of the study in EG compared to CG where the educational process introduced the technology of social and communicative competence of future trainers of higher education establishments in the process of Master's degree acquiring has revealed the significant positive changes in the levels of social and communicative competence of Master's degree students: the percentage of Master's degree students in the experimental group with the high level performance is increased from 19,4% to 39,8%, the number of future trainers of HEE (Master's degree students), who showed a low level performance is decreased significantly (from 46,9% to 11,2%), in the control (or regular) group there are positive, but insignificant changes: high level of Master's degree students is from 18,8% to 22,9%, acceptable level – from 31,2% to 32,3%, low level – from 50,0% to 44,8%. Substantiation of the conclusions and verification of statistical differences of Master's degree students of control and experimental groups were carried out using Pearson's chi-squared distribution test ( $\chi^2$ ).

The assumption of the authors of the article, that the success of the development of social and communicative competence of future trainers of higher education establishments in the process of Master's degree acquiring provided with the introducing the theoretically substantiated development technology of social and communicative competence of future trainers of higher education establishments in the process of Master's degree acquiring aimed at the development of motivational-value, cognitive, operational-activity, personal components of defined competence, is confirmed.

The prospects of further research is recognized in the analysis of professional self-realization paths of the Master's degree graduates in education-professional programs in higher education establishments of Ukraine.

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## Formation of national self-consciousness of future musical art teachers in the process of their professional training

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**Abstract.** The authors of the paper analyze the definition of “national self-consciousness” and outline its structure, which includes self-esteem, socio-psychological expectations, and self-identification. From the point of view of the authors of the paper, the national self-consciousness of future musical art teachers includes three interrelated components. They are: an information-cognitive one, which involves mastering the system of general knowledge and special knowledge, as well as the possession of certain information regarding one’s own self-identification; an emotional and value one, which reflects patriotic feelings, the desire for the national ideal, the value attitude towards the Ukrainian cultural heritage; and a reflexive and activity one, which characterizes the awareness of the nationality, awareness of oneself as a bearer of cultural values and heritage of the nation, and awareness of one’s role in future professional activities. As a result of the analysis of the researches on the problem under our consideration, we made some conclusions about the ways of forming the national self-consciousness of young people. The authors of the paper conducted a pedagogical experiment that allowed identify methodological aspects and suggest forms and methods that should be used in the training process to form the national self-consciousness of future teachers of musical art.

### 1 Introduction

The state of Ukraine chose the path of its independence in 1991. The reform processes that have taken place in Ukraine for thirty years affected the national educational system. This system subsequently received transformations in the fields of education reforming, informatization, modernization of its structure, content and organization, updating its regulatory framework, and the like. Modern educational policy considers its strategic priority the formation of a nation that is constantly learning, assimilating democratic values at the same time. The nation, which develops its civil society and tries to affirm human-centered values in education [1].

An important role in the formation of such a nation belongs to higher pedagogical education, to the musical pedagogical education, in particular. This education aims at providing professional training for a competent music teacher capable of solving professional problems. It also aims at obtaining an active civic position in teachers who should be patriots of their country and be responsible for the preservation and development of the spiritual values of the nation. New social, economic, political, and cultural realities (that is, the processes of globalization, integration, informatization, changes in the system of moral

values, migration of young people abroad, circumstances related to Russian aggression, and the like) require a review and updating of methods, forms and means of music teachers training. These teachers should meet the demands of our modern civil society. In our opinion, this is the reason why a higher educational institution should become the center of formation of national self-awareness of future musical art teachers. Here, at this institution, every teacher should focus not only on teaching but also on his educational work, because teaching and education are a holistic syncretic pedagogical process. Here, at this institution, every teacher should focus not only on teaching but also on his educational work, because teaching and education are a holistic syncretic pedagogical process.

The Ukrainian state has had several vectors of its development – from the pro-Russian to the European one for these 30 years of independence. Subsequently, the confrontation in the Ukrainian politics found its reflection in the content of concepts aimed at formation of a new generation: the Concept of the national education system (1996), the Concept of national-patriotic education (2009), the Concept of the National Target Program of Patriotic Education of citizens for 2013-2017, the Concept of the Civic Teaching and Education in Ukraine (2012). Although every concept became a navigator for the formation of a system of national education of student youth in its own way, none of those concepts was fully implemented. The next attempt to outline the new directions

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and clarify the components of national-patriotic education was the Concept of national-patriotic education of children and youth (2015) and the Strategy of national-patriotic education (2019), which identified the national-patriotic education in Ukraine as one of the state and society priorities in the development of national identity.

The policy in the sphere of education in this country focuses on modern concepts of European countries, which pay special attention to cultural and national achievements: the UNESCO Convention on the Importance of Cultural Heritage for Society (2005), the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions (2010), the Cultural Education Program, developed by the National Advisory Committee on Creative and Cultural Education (NACCCE) in England (2013) and others.

The concept of national awareness has existed in the Soviet pedagogical science since the 60-s of the XX-th century. The first scientific researches of those times considered the national awareness as one of the most essential features of the nation, but the theory of “a united Soviet people” due to the “merger of nations” [2], was in priority for Soviet ideology. That is why, in fact, the concept of the national awareness dealt mainly with the Russian nation that was more dominant within the boundaries of the USSR and the concept had a very significant ideological subtext. Following the collapse of the USSR, it became possible to research more objectively the issues of a nation, national self-awareness and identity, and patriotism.

The concept of national awareness (as well as the concepts of consciousness, self-consciousness) is the object of the study of many social sciences and humanities. Each of these sciences considers certain aspects of this construct regarding the vector of the research. In the context of our study, we are primarily interested in the philosophical, psychological and pedagogical aspects of this phenomenon.

Ukrainian philosopher F. Shandor, analyzing the meaning of the terms “consciousness” and “self-consciousness”, notes that modern the scientists-philosophers study the formation of consciousness mainly through the formation of human self-consciousness as the ability and need to properly assess and analyze the behavior and activities of others. And then project those behaviors and activities on themselves. The author notes: if, with the help of consciousness, a person learns and perceives the world around him and if a person can orient in this world in a certain way, then the self-consciousness is mainly aimed at self-knowledge [3]. The researcher distinguishes the terms respectively – “national consciousness” and “national self-consciousness”: national consciousness is a set of features of an individual, of a group or of a community. Those features arose in the process of communication with representatives of other national communities [4].

Modern Ukrainian scientists in the field of psychology (M. Boryshevskyi [5], A. Berezin [6], N. Yevdokimova [7], L. Spivak [8], A. Hafiatulina [9]) interpret national self-consciousness as a complex, multilayered, integral concept.

M. Boryshevskyi defines national self-consciousness as a person’s awareness of himself as a part of a certain national (ethnic) community and his self-assessment as a carrier of national (ethnic) values. These values were formed in the process of long historical development of the national community, its self-realization as a subject of social reality. Unlike F. Shandor, the researcher makes the concepts of national consciousness and national self-consciousness equal, he considers them inseparable [10]. The psychologist includes self-esteem, harassment, socio-psychological expectations and “self-image” into the structure of national self-consciousness [5].

While studying the scout movement, as one of the factors in the formation and development of national self-consciousness of youngsters, researcher N. Yevdokimova adds self-identification to the components identified by M. Boryshevskyi [7].

A. Berezin combines national self-consciousness with an ethnic one. He interprets national consciousness as a system of conscious ideas and assessments of the components of real life of the ethnos. These components make the ethnos different, at the same time consolidating them. When master this real life, the person realizes himself as a representative of the ethnos (nation). Consequently, the researcher specifies these components of the ethnos (nation)’s understanding. They are: ethnopsychological uniqueness of person’s own community; psychological and cultural specifics of his ethnic group; kinship and identity with his own ethnic community; his personal ethnopsychic characteristics; he as a subject of his own ethnic group [6].

According to L. Spivak, the national consciousness of an individual is an integrative process of his self-knowledge, his emotional and value attitude to himself as a subject of a particular nation, as a bearer of values of his nation. As a result of this integrative process an individual regulates his own behavior in national interactions. The researcher singles out the following components in the structure of the national consciousness: a cognitive one (self-perception, self-analysis, self-understanding, conscious ideas of the individual about himself as a representative of a particular nation), an emotional-value one (self-feeling, self-assessment as a representative of the nation, attitude of the individual to himself as a subject of the nation, emotional-value self- attitude), and a regulatory one (self-regulation in interethnic and domestic interactions) and the core – the national “I” [8].

A. Hafiatulina defines national self-consciousness as a form of social consciousness that has a socio-political origin, on the one hand, and ethnic and cultural background, on the other hand; this social consciousness arises in the process of social life and life of the nation. The scientist, for the first time, defines the psychological features of the formation of national self-consciousness of students of different regional mentalities.

Ukrainian scholars in the field of pedagogy have begun to study the issue of forming the national self-consciousness of pupils of secondary schools and students of higher educational institutions most actively since the proclamation of independence of Ukraine.

V. Borysov in the first fundamental pedagogical study that reveals the theoretical and methodological foundations of the formation of national consciousness of pupils and students, considers national self-consciousness as a system of aggregate elements, which are in relations and connections with each other and in this way they form a certain unity. The researcher substantiates the structure of national self-consciousness with an emphasis on awareness of the peculiarities of the national culture of their nation; on awareness of the psychological characteristics of their nation; on awareness of their identity with the nation; on awareness of their own psychological characteristics; on self-awareness as a subject of their national community; on socio-moral self-esteem of the national [11]. V. Borysov's research gave impetus to the search for technologies for the formation of national self-consciousness of student youth by means of Ukrainian musical art (S. Borysova [12]), decorative and applied arts (O. Hevko [13]), fiction literature (V. Sokolova [14]), (L. Bilozub [15]), museum pedagogy (S. Voloshyn [16]), etc.

The national focus of the professional training of future music teachers as bearers of national cultural values is highlighted in the papers that highlight one of the contexts or means of the education of students' national consciousness. These contexts or means are the following: in the process of mastering Ukrainian folk song culture (R. Osipets [17]); by means of Ukrainian piano art (H. Sikora [18]); by means of folklore and ethnographic art (I. Pashchenko [19]); by means of musical art (V. Kupchyk [20]); in the process of the analysis of musical works (L. Vasylieva [21]); in the process of ethno-cultural training (A. Kozyr [22]); by means of folk song art (O. Krus [23]).

The scientific monograph of the specialists of the Department of the Musical Arts (V. O. Sukhomlynskyi National University of Mykolaiv) on the problems of national-patriotic education of students by means of musical arts deserves our special attention. The monograph highlights the results of the approbation of the theoretical approach towards the effectiveness in the use of musical arts as a means of patriotic education of future teachers in the educational environment of a higher educational institution [24]. The monograph also pays attention to the research of K. Kucheruk-Drozdova [25] on the readiness of future musical art teachers to educate national self-awareness in their pupils. The researcher mentioned above substantiated, for the first time, the theoretical and methodological principles of the professional training of future musical art teachers in educating national self-awareness in their pupils.

The analysis of the scientific sources shows that the simultaneous (parallel) study of the phenomenon of national self-consciousness in philosophy, psychology and pedagogy contributes to the mutual enrichment of these sciences with new meanings and ideas, which affect their development. We can state that there is no established concept of national self-consciousness; scholars constantly clarify and deepen its content, depending on the social, economic, and political processes that take place in the state. The scientists consider the formation of the national

self-consciousness of future musical art teachers from different angles and aspects, but they have not yet built a holistic system of this phenomenon, despite the growing scientific interest in the problem under our discussion. The issue of the national consciousness does not lose and will not lose its relevance as long as the processes of the development of the Ukrainian state take place.

While researching the issue we used the following *methods*: theoretical analysis, synthesis, generalization of philosophical and psychological-pedagogical literature. It allowed us clarify the essence of the concept of "national self-consciousness" and determine its structure; diagnostic methods (pedagogical observation, survey, questionnaire, testing, self-assessment method, creative tasks); pedagogical experiment to test the content, forms and methods of the formation of the national self-consciousness of future teachers of musical art.

## 2 Results and discussion

The theoretical analysis of the problem of the formation of national self-consciousness of future musical art teachers made it possible to consider this concept as an integrative combination of three interconnected components: an information-cognitive one, which involves mastering the system of general knowledge (language, history, traditions, mentality, and culture) and special knowledge (musical art, folklore, folk art, artistic heritage), as well as the possession of some certain information about individual's own self-identification; an emotional and value one, which reflects patriotic feelings, the desire for the national ideal, the value attention towards the Ukrainian cultural heritage; and a reflexive and activity one, which is characterized by awareness of nationality, awareness of individuals as the bearers of cultural values and heritage of the nation, awareness of their role in future professional activities.

The formation of national self-consciousness of future teachers of musical art, in our opinion, is possible under the conditions of obtaining both general knowledge and special musical knowledge, which fully characterize the national characteristics. According to L. Masol, the organic combination of universal (general human, multicultural), national (state) and regional (ethnolocal, of local history) components of education and upbringing is an unconditional priority of students' national orientation. Musical art is one of the most powerful means of education and influence, which allows a person to learn the national culture of his people and create his own spiritual world [26].

A musical work (like any work of art) is an artistic and information system. H. Lokarieva states that we form this system by means of synthesizing several types of information, namely: cognitive, artistic, aesthetic, intellectual, emotional, psychological, moral, ethical, individual and author, pragmatic and psycho-energetic. We express each type of information in an artistic form, and a work of art is both a carrier of information and a means of its transmission [27].

We determine national self-consciousness primarily by mental characteristics and axiological orientations. Thus,



H. Tarasenko emphasizes that “knowledge without the transmission of value attention towards it is dead, and, later, even dangerous” [28]. Minding this statement, we consider an emotional and value component in the formation of national self-consciousness of future teachers of musical art as an extremely important one. This component is focused on creating a system of values (universal, national, professional), education of stable citizenship, patriotism, national ideal and value attention towards the Ukrainian cultural heritage on the basis of musical nationalism. We think it necessary to note that in the musical art, we associate the concept of “nationalism” with the depiction of musical ideas and motives by composers. These musical ideas and motives are identified with a particular country, region or ethnicity. S. Liudkevych was the first among the Ukrainian music studying scholars to use this term in the article “Musical nationalism”. The article highlighted the issue of the formation of the national orientation in the Ukrainian music, comparing it with similar phenomena of other musical cultures [29].

The revival and development of national traditions involve communication with the national musical art. According to O. Rudnytska, the musical art improves the ability to see, feel, and contemplate, because the works of art offer artistic images directly addressed to the sensory sphere, emotions and feelings of man and aimed at “... “capturing” this sphere, make a person sympathize and empathize” [30]. This encourages the individual to creatively comprehend his own national essence, promotes the development of a sense of ethnic identity through perception and emotional experience, affects his consciousness, and determines spiritual values.

Regarding the scientific substantiation of researches on this problem, we note that national self-awareness is closely related to reflection as a process of self-knowledge and self-determination, awareness of nationality, self-understanding in the context of national culture. In particular, H. Padalka defines the leading role of the “artistic reflection” in the process of learning. The scholar interprets the artistic reflection as awareness of individual’s own mental states in comparison with experiences reproduced in an artistic image, immersion into his own feelings, in comparison the content of artistic images with the results of the self-analysis of his inner life [31]. Thus, future teachers of musical art influence the formation of their own self-awareness in the process of the artistic reflection.

In their future professional activity music teachers should not only realize themselves as bearers of cultural values and heritage of the nation, but should also be ready to pass them to the next generation. Since all three components of national self-consciousness (knowledge, value attentions to it and actions) are interconnected, knowledge and values, which do not motivate students to action and active creativity, which are not fixed in their behavior and specific actions, lead to deformation of the national self-consciousness of the individual.

Accordingly, we should consider the national self-consciousness of future musical art teachers as an integrative trait of a personality. This trait involves mastering the system of general and special musical knowledge about

the history, ideas, traditions, culture of their people, a clear patriotic position, awareness of belonging to their nation, reflection of emotional and value attitude towards the national musical heritage, desire for creative self-realization in the professional musical activities.

The organization of the experimental study involves, first of all, the diagnosis of the current state of national self-consciousness of future musical art teachers. We carried out this diagnosis with the students who learn at the specialty “Musical art” at the Communal Higher Education Institution “Vinnytsia Humanities Pedagogical College”.

For this purpose, we identified the criteria, which correspond to the structural components of the national self-consciousness of students, and we also developed the corresponding indicators. They are: the information-cognitive criterion (the integrity of general knowledge (language, history, traditions, mentality, culture), the amount of special musical knowledge (musical art, folklore, folk art), the development of cognitive abilities; the emotional and value criterion (a clear patriotic position, value attitude to the national cultural heritage, ability to emotional empathy); and the reflexive and activity criterion (identification of national affiliation; awareness of the role of future musical art teachers in the process of national education of youth; readiness for creative self-realization in the socio-cultural musical activities).

We used a complex of empirical research methods (observation, survey, questionnaire, testing, methods of self-knowledge, methods of self-assessment, creative tasks, etc.) to solve the research goals.

The results of the diagnosis showed that the real state of national self-consciousness of future musical art teachers is mainly at low (31%) and medium (54%) levels. We diagnosed a small number of students with a high level (15%). Regarding the fact that the traditional content of higher music education does not provide the formation of national consciousness of future teachers of musical art of a high level, we think it essential to update the content, forms and methods of the educational process. And that was a very important component of our research.

The formation of the national consciousness of future musical art teachers involves the search for optimal means in the teaching process and in the educational work likewise. First of all, we speak about the subjects of professional training (“Music pedagogy”, “History of Ukrainian music”, “Ukrainian folk music”, “Ethnomusic studying”, “Voice training”, “Basic special instrument”, “Choral conducting”, “Choral class”) and educational activities.

The teaching process of the voice production of future music teachers have been characterized by professional and genre differentiation in recent decades. Traditionally, the vocal education in educational institutions was based only on classical singing. But, with the development of the music industry, we can observe a demand for such specializations as “Variety singing” and “Folk singing”. However, as a rule, a teacher with an academic style of singing teaches also those students who have a pronounced folk voice and a folk manner of performing. It is not always possible to “retrain” these students, and as a result, they

lose their folk style skills and, unfortunately, they do not succeed in academic singing.

The folk style of singing has deep roots in Ukraine. This style is inextricably linked to country's history, culture and customs. Therefore, we think that the loss of the natural folk style of singing is also the loss of a part of Ukrainian culture. That is why the issue of the need of the pedagogical staff of the specialization "Folk singing" is so acute. The teacher with appropriate education makes it possible to purposefully monitor the students with a pronounced folk style. This teacher trains students in his voice classes according to the methods of teaching of "Folk singing" using the repertoire of the Ukrainian musical heritage.

In modern conditions, the issue of involving young people in the folk tradition of Ukraine, in the preservation and promotion of its best examples is of vital importance. To achieve this goal, the educational and professional program of training of music students includes a number of subjects and practices, for example, the subject "Ukrainian folk music" precedes the folklore practical training named "Ethnomusic studying" Their task is to form a holistic system of knowledge about Ukrainian folklore in students, to reveal the meaning of the rituals of the people, to study the calendar-ritual songs, to arouse interest and love for folk music. According to A. Storozhuk, Ukrainian folk songs "have a power that allows modern youth to "touch" the past, to feel the pure spirit of many generations of our glorious national "family" tree, to deepen, to touch the awe of our ancestors, to comprehend the content of the thoughts of our ancestors in our modern, civilized and contradictory time" [32].

The student folklore practice solves the following tasks: to deepen the knowledge of various stylistic traditions of Ukraine, its dialect lines and trends in genres and stylistics; to form in future teachers of musical art a correct understanding of the current state of the development of folk music, which will help them develop the right attitude to the existing folk culture; to expand their ideas of the main features of the musical folklore of the Podillya region; to involve students in research activities, that is, to collect and preserve the samples of folk songs for their further use in student pedagogical work (demonstration and studying of folk songs at musical art lessons, expanding the repertoire of vocal ensembles, etc.). Our teaching experience shows that the knowledge of modern students of the Ukrainian folk repertoire is very limited; for these students the most popular, until recently, examples of Ukrainian songs, such as "Nese Halia vodu" or "Tsvite teren", are the real "discoveries". Knowledge of musical rituals is also very limited.

That is why the teaching of these subjects has an important impact on the formation of the students' national self-consciousness. Each folklore expedition has its theoretical and practical stages. At the first stage, the students (with the help of reference books and periodicals) get acquainted with the history of the place where the practice will take place, with its socio-economic and cultural state; the students also master the skills of collecting folklore materials and recording the work of the expedition. The

collection of folklore materials (at the practical stage) involves identifying the conditions of folklore appearance in the village and the performers of folklore; drawing up a map-scheme of the settlement, where the students found out interesting folklore objects; audio and video recording of the folklore works, their certification and decoding; systematization of the musical material. Thus, on the bases of the study of samples of musical folklore of the Podillya region, young people acquire an understanding of the identity of the Ukrainian people, they enrich their musical impressions, develop their musical taste, and accumulate song "baggage" for their future work at school, because from each folklore practice held in the Vinnytsia region, future musical art teachers bring up to 50 new folklore texts.

For example, in the village of Shervone the students got a Kupala song "Oi, na Kupala vohon horyt", a Petrovska song "Oi, khodyla ta Daryna po poliu", wedding songs "Iak na korovai ishla", "Iak my korovai misyly", "Do kosy, bratiku, do kosy", "Oi, na dvori proso molotiat", household songs "A v horodi hrushechka", "Oi de bula pshenytsia", "Veselist, veselist", "Posiiala ohirochky", "Oi, barvin, ty barvin", "Sukha lishchyna"; in the village of Lisova Lysiivka the students got household songs "Polovyna sadu tsvite, polovyna – viane", "Odyn misiats skhodyt", "Dolyna shyroka, kalyna vysoka", "Oi, povii, vitre, z yaru"; in the village of Demydivka – household songs "Synia kvitka", "Ne sama-ne sama" and others.

In order to promote Ukrainian folk songs, the college has folklore ensembles, the repertoire of which consists of the folklore of the Podillya region – both ceremonial and domestic folk songs; these songs are performed without any musical accompaniment in the local folk (authentic) manner, typical for the Podillya region.

The obligatory requirement of the subject "Voice production" is the performance of the Ukrainian folk song acapella. The learning purpose of this task is the ability of pure intonation; the educational purpose is the love for folk music of the Ukrainian people. When choosing a repertoire for performing a work by a modern composer, teachers select the works by contemporary authors of the Podillya region: H. Biliavskiy ("Ukraina", "Liuba Vinnytsia", "Pisnia nad Podilliam", "Velychni dzvony", "Nasha mriia"), E. Brylin ("Mii ridnyi kraj", "Symvoly Ukrainy", "Letily husonky", "Try dorohy", "Topolyna vulytsia"), O. Ianushkevych ("Na krylakh mrii", "Ie lysh vy", "Lukasha sopilka", "Zlety, liubove", "Liubystok", "Shche ne osin", "Oi pryletily dva holubochky") and others. Creative meetings with fellow composers, attending their master classes, acquaintance with new musical works; all these activities not only inspire and fascinate students, but also contribute to the understanding of their nationality.

The song repertoire for children has changed radically in recent decades. Works of the "Soviet era" are less and less studied. More and more songs for children of Ukrainian composers are studied: M. Dremluha ("Vesniani kraplyny", "Rankova pisnia", "Oi zahraly komari", "Stoit kozlyk nad vodoiu"), L. Dychko ("Zyma", "Pryhoshchaites, ptashky!"), A. Filipenko ("Veselyi muzykant", "Kurchata", "Ziablyk", "Kozlyk v poli tant-

siuvav", "Zaiko", "Veseli cherevychky", "To snizhynky, mov pushynky", "Uziata lysychka skrypku"), M. Haivoronskyi ("Yikhav strilets na viinonku", "U stepu", "Zyma i vesna", "Vzhe lito", "Za ridnyi kraj"), L. Revutskyi ("Sonechko", "Idy, idy, doshchyku", "Kolyskova", "Pisnia"), Yu. Rozhavskyi ("Vesnianochnka", "Shcho skazav meni leleka"), Ya. Stepovyi ("Snizhynky", "Shchebetala ptashechka", "Misiats yasnesenkyi"), K. Stetsenko ("Vechirnia pisnia", children's opera "Lysychka, Koty i Pivnyk"), as well as children's songs by contemporary composers H. Biliavskyi ("Kolorovi parasolky", "Pisenka nadii", "Bakteriia", "Harnyi svit", "Litolitechko", "Shkilnyi dzvinok"), E. Brylin ("Slukhai, vesnonko", "Romans Perepilky", "Velykyi i малыi", "Nevdalyi vystup", "Mamyna usmishka"), L. Horova ("Muzyka zvuchyt", "Vidchynylosia zhyttia", "Dvi pisenky", "Mriinytsia", "Dobryi vechir, liudy", "Yide, yide Boh"), O. Ianushkevych ("Veselkova pisnia", "Pisenka pro zariadku", "Lito zolote", "Chomuchky", "Dytynstva svit", "Treba mriiaty zavzhdy", "Mama i ya"), V. Kolotii ("Bukvaryk", "Topolyna pisnia", "Drimaiut sela"), I. Kyrylina ("Spivaiut dity", "Zelene slonenia", "Bychok ta yizhachok", "Zasmutylos koshenia", "Pisenka"), N. Mai ("Mii bukvaryk", "Mamyna sorochka", "Zolotava osin", "Sopilochka"), M. Mazur ("Kolorovyi svit", "Do sontsia, do neba", "Chas", "Nova mashyna"), A. Mihai ("Multyky", "Sim not", "Podarunok", "Khytalochka-hoidalochka"), O. Peniuk ("Mykolai ide", "Zaichyk", "Mamyni rushnyky"), etc. These songs are written on the lyrics of modern authors. The update of the children's song repertoire is due to the implementation of the subject "Art". The teachers of the department initiated and launched a competition of amateur composer's skills "Zolota Nota" for future musical art teachers. It was done in order to help students better understand the nature of the Ukrainian children's song. The best competition works on the lyrics of domestic poets are later presented in the musical collection "Musical colors of childhood". Competitions of this kind encourage students to creativity; they create a "situation of success", and give an impetus for student creative self-realization.

The education of the younger generation changed its vector to a national-patriotic trajectory with the proclamation of independence of Ukraine. Special music subjects required a revision of the repertoire policy; in particular they required changes in the curriculum on the subject "Basic musical instrument". Works based on national roots play a very important role in the formation of national self-consciousness. For instance, the educational potential of national folklore in the domestic piano literature is represented by a large independent section, numerous adaptations of Ukrainian folk songs and dances.

Today we speak about the shift from the professionalization of education to its educational principles [33] in the educational process of playing musical instruments.

Accordingly, there appears a need to enrich the piano repertoire by including works by Ukrainian composers V. Barvinskyi, V. Bezkorovainyi, I. Berkovych, V. Bibik, O. Bilash, E. Brylin, B. Filts, M. Fomenko, V. Hrudyn, M. Karminskyi, M. Kolessa, L. Kolodub, Zh. Kolodub, A. Kos-Anatolskyi, M. Kravtsiv-Barabash, B. Kudryk,

K. Kuklovskyi, H. Kurkov, V. Kyreiko, B. Liatoshynskyi, Ya. Lopatynskyi, Z. Lysko, F. Nadenenko, N. Nizhankivskyi, V. Podvala, V. Pukhalskyi, L. Revutskyi, Yu. Rozhavska, S. Turkevych, M. Tutkovskyi, V. Vytvytskyi, Ya. Yaroslavenko, H. Sasko, R. Savytskyi, I. Shamo, S. Shevchenko, Yu. Shchurovskyi, D. Sichynskyi, M. Skoryk, I. Sonevtskyi, M. Stepanenko, M. Sylvanskyi, V. Sylvestrov and others. Updating the musical and pedagogical repertoire is only the first step towards the realization of the value of the national cultural heritage. While working on each work, the student must understand, get experience and "appropriate" the emotions that the composer wanted to convey. A piece of music that has not found an emotional response in a student, respectively, cannot have an educational impact on him. Future musical art teachers will present the results of their work during the annual concert "Music of Ukrainian composers"; at this concert students and teachers perform vocal and instrumental works by Ukrainian composers. Creative communication and emotional mutual enrichment contribute to the awareness of future musical art teachers of their role in future professional activities.

In addition to works of foreign choral classics, the repertoire was replenished with samples of Ukrainian folk songs and choral works of Ukrainian composers. These works are by A. Avdiievskyi ("Pavochka khodyt", "Dibrova zelena", "Chuiesh, brate mii", "Tsvite teren", "Oi tam za lisochkom", "Na potochku prala", "Handzia", "Dumy moi, dumy"), M. Kolessa ("Oi umer staryi batko", "Utoptala stezhechku", "Iakby meni cherevyky", "Bulo kolys na Vrainsi", "A ya pidu v polonynu"), M. Leontovych ("Shchedryk", "Kozaka nesut", "Dudaryk", "Iz za hory snizhok letyt", "Zhenchychok-brenchychok", "Haiu, haiu, zelen rozmaiu"), S. Liudkevych ("Hahilka", "Oi, Moroze, Morozenku", "Bodai sia kohut znudyv", "Pro Bondarivnu", "Oi zatsvily fiialochky"), M. Lysenko ("Oi ne svity, misiachenku", "Oi khodyla divchyna berezhkom", "Verkhovyno, svitku ty nash", "A vzhe vesna", "Sontse nyzenko"), K. Stetsenko ("Svitiat zori", "To ne buinyi viter", "Chuiesh, brate mii") and others.

The educational institution also initiated and launched annual workshops for teachers of music in the region under the general name "U koli kanoniv" ("In the circle of canons"). The purpose of these workshops is to popularize choral art in schools, to involve pupils and students in studying the heritage of the world and domestic choral art, to get acquainted with the methodology and experience of choirs (the best choirmasters of the city and the region), and to present new music textbooks for school choirs. In this way, workshops, with the participation of student choir, promote the students' awareness of themselves as representatives of the Ukrainian nation and foster their sense of patriotism.

We consider the project method, which ends in a creative product and involves the presentation of the results of individual, group or collective work, one of the effective methods of forming the national self-consciousness of future musical art teachers. For example, students not only acted as researchers, but also tried themselves as bloggers in the project on the history of Ukrainian music "Ukrainian

musical culture of the 50-80s. Song heritage”. They video recorded the material, illustrated it with videos of works on the research topic. All materials were mounted in a two-part video series and posted on YouTube and Facebook. The result of the project was the student assimilation of musical cultural values of this era.

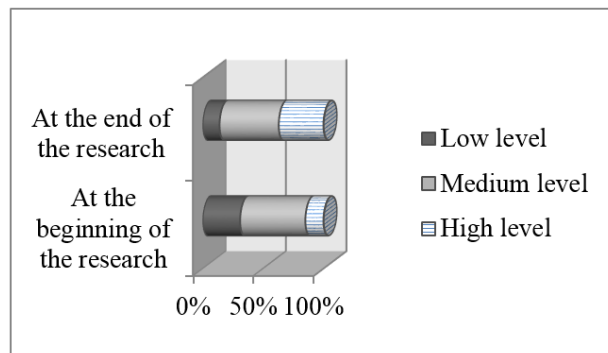
Mass-media have a significant impact on the formation of student self-awareness. Modern youth lives in mass-media, in music information in particular, and prefers modern world’s pop and rock music. In order to communicate with young people in one musical language, the students were offered an experimental music project. The famous Ukrainian folk songs “Podolianochka”, “Oi dub, dub”, “Vasylyna” were performed in the academic manner, but with modern electronic dubstep support in the project. Such reformatting of contributes to obtaining a positive educational effect, to attracting students to choral singing as a national tradition.

One of the modern forms with educational influence is a challenge (a genre of Internet videos, in which a blogger performs tasks on a video camera, shows them online, and then offers to repeat the task to his acquaintances or an unlimited number of users). The students of the college launched several challenges, which involved students and teachers vocal and choral groups: in honor of the 100th anniversary of the first performance of the choral arrangement of “Shchedryk” by M. Leontovych (2016–2017); known worldwide as “Carol of the Bells”; flash mob #Chervonaruta50challenge, launched in support of the 50th anniversary of the song “Chervona ruta” of the famous Ukrainian composer V. Ivasiuk (2020). The educational influence and uplift of those challenges cause “responses” of a large number of singers from Ukraine and around the world.

While studying the subject “Music pedagogy” students get acquainted with the history of musical and pedagogical education in Ukraine, they conduct research activities to study the work of Ukrainian composers and musicians. Future musical art teachers present their research on the musical and pedagogical activities of Ukrainian composers (F. Kolessa, M. Leontovych, S. Liudkevych, M. Lysenko, Ya. Stepovyi, K. Stetsenko, I. Vorobkevych) at international scientific and practical conferences. Students’ involvement in the study of the historical past of Ukraine and of the musical heritage educates in them a sense of pride for the spiritual achievements of their nation.

We also consider the participation of students not only in regional and national, but also in international competitions and festivals one of the means of involving future musical art teachers in the promotion of national choral music. At these competitions and festivals students feel a special responsibility to represent their country and use national symbols with great pride in the most solemn moments – when they unfurl the National Flag of Ukraine and perform the National Anthem of Ukraine.

At the end of the formative stage of our experimental work a control monitoring. Its results showed that the introduction into the educational process of the proposed, forms and methods of forming national self-consciousness of future teachers of musical art contributed to positive



**Figure 1.** Dynamics in the formation of national consciousness of future musical art teachers

changes. In particular, we fixed an increase in the number of students with a high level of national self-consciousness from 15% to 37%, while the number of future specialists with a low level decreased from 31% to 14% and the medium level – from 54% to 49%. The results of our experimental research study are presented in the diagram (figure 1).

The qualitative and quantitative results obtained in the course of the research allow us speak about the effectiveness and prospects of the proposed methodological aspects of the formation of the national self-consciousness of future teachers of musical art.

### 3 Conclusions

As the result of the theoretical analysis, we have determined that the national self-consciousness of future teachers of musical art is an integrative property of any individual. It includes mastering the system of general and special musical knowledge about the history, ideas, traditions, culture of their people, a clear patriotic position, awareness of belonging to their nation, reflection of emotional and value attitude to the national musical heritage, desire for the creative self-realization in professional music activities.

We have identified the criteria that correspond to the structural components of national self-consciousness of students and developed its indicators: an information-cognitive criterion (the integrity of general knowledge (language, history, traditions, mentality, culture), the amount of special musical knowledge (music, folklore, folk art), and the development of cognitive abilities); an emotional and value criterion (the clear patriotic position, the value attitude to the national cultural heritage, and the ability to emotional empathy); a reflexive and activity criterion (the identification of nationality; the awareness of the role of a future teacher of musical art in the process of the national education of youth; the readiness for creative self-realization in socio-cultural musical activities).

We have proposed forms and methods for use in the process of professional training to form the national self-consciousness of future teachers of musical art: cultural and artistic projects; challenges; flash mobs; competitions of amateur compositions; artistic meetings with Ukrainian



composers (including the composers of Vinnytsia region); attending their master-classes; organizing workshops with the participation of student choirs, music teachers and the best choirmasters of the region; participation (as performers) of future musical art teachers in the concerts of Ukrainian composers; participation of the vocal and choral groups not only in regional and national, but also in international competitions and festivals; presentation of scientific researches on the musical and pedagogical activity of Ukrainian composers at the Ukrainian and international scientific and practical conferences.

We have identified the factors that provide the national content of the professional training of future teachers of musical art, including: updating the music and pedagogical repertoire by increasing the share of the national component; making changes to the program requirements of the subjects “Voice production”, “Choral class”, “Basic musical instrument”, a particular requirement – the obligatory performance of a work by a Ukrainian composer; implementation of new subject “Music pedagogy” and folklore practice “Ethnomusic studying”; replenishment of the staff with folk vocal specialists who have appropriate education to teach the subject “Voice production” for the students with a pronounced folk style of singing.

We have experimentally proved the effectiveness and prospects of our proposed content, forms and methods of forming the national self-consciousness during their implementation in the process of professional training of future teachers of musical art.

The research presented, of course, does not cover all aspects of the problem. The prospects for further research include updating the content of music subjects in accordance with the modern educational standards and programs, taking into account the personal approach in teaching. The prospects also include developing and implementing a system of integrative courses that will more effectively develop the national self-consciousness of future musical art teachers.

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## ICT as a tool to form the readiness of future teachers to work with left-handed education applicants

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**Abstract.** The article points out that currently in Ukraine the increasing attention is directed to the definition of ICT, providing the maximum consideration of individual peculiarities of education applicants. The approaches to the definition of left-handed education applicant (left hand is the leading one) and the notion of ambidextrous (the ability of a person to use both hands equally) are identified. In order to determine the readiness of future teachers to work with left-handed education applicants, a survey of second- and third-year students at Oleksandr Dovzhenko Hlukhiv National Pedagogical University was conducted. It was determined that the vast majority (over 80%) among them have limited understanding of the peculiarities of teaching left-handed people. It is proved that there is an urgent need for specialists with appropriate theoretical and practical training, who are capable of effectively teaching left-handed pupils in accordance with their individual-psychological features. The level of empathy found in future educators indicates a positive psychological state of the vast majority of students, which will enable them to form inclusive competence more effectively. It is determined that the "mirror reflection method" is scientifically and methodologically justified to work with left-handed education applicants. In order to prepare future educators to work with left-handed education applicants, online software for mirroring photo and video materials has been identified.

### 1 Introduction

Reforming higher education in Ukraine, moving to a new person-centred approach in training and education is impossible without creating the necessary conditions to ensure sustainable development of the teacher himself [1, 2].

Information and communication technologies (ICT) are significant drivers of the globalization of society. When it comes to inclusion in education, they can help education applicants with special needs to realise their right to study, fulfil their potential and socialise in society [3] and [4].

The UNESCO prohibit any exclusion from, or limitation to, educational opportunities on the basis of socially-ascribed or perceived differences, such as by sex, ethnic/social origin, language, religion, nationality, economic condition, ability. Reaching excluded and marginalized groups and providing them with quality education requires the development and implementation of inclusive policies and programmes. In this context, UNESCO promotes inclusive education systems that remove the barriers limiting the participation and achievement of all learners, respect diverse needs, abilities and characteristics and that eliminate all forms of discrimination in the learning environment [5].

According to the Centre for Public Monitoring and Control, among 1,337 Ukrainian schools, only 1,127 are adapted to the needs of inclusion in education. More than 56,000 schoolchildren, future professional education applicants with disabilities, are not enrolled at all in general education institutions. Therefore, only significant changes in the structure of the national education system towards inclusion in education will make it possible to form a qualitatively new mechanism of interaction between pedagogical institutions to ensure the socialization of each student [6].

The solution of the problem of inclusion in education is mutually conditioned by taking into account the individual characteristics of students: peculiarities of perception of the world, thinking, memory, imagination, interests, aptitudes, etc., that is all that largely predetermines the process of mastering knowledge, practical skills, formation of personal qualities and professional abilities.

Nowadays in Ukraine more and more attention is directed to the identification of ICT, which ensures maximum consideration of individual features of education applicants.

Training and education of left-handed students has been studied in a number of studies [7–22].

M. Annett's research points out that cultural and biological factors interplay in determining the leading hand [23]. M. Annett emphasizes the contradictory nature of theories and research in this field.

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Even at the early stages of mental development of right- and left-handed children, differences related to the peculiarities of functional specialization of the brain hemispheres are noticeable.

The problem of the development of emotional-volitional and motivational spheres of personality is covered in a number of scientific works, where the connection of indicators of asymmetry of the human brain with its individual-psychological peculiarities is established.

In particular, the functional asymmetry of the brain was studied in [24–43]. Scientific research shows that the functional asymmetry of the brain has a significant impact on the formation of mechanisms of perception and learning.

Scientists believe that a teacher must have knowledge about the types of functional asymmetry of the brain, must be able to identify the individual profile of the lateral organization of the brain, as the educational technology of the third millennium must be built with due regard for the individual characteristics of a child.

The above-mentioned aspects of future teachers' training refer to the concept of "inclusive competence". The stages and features of inclusive competence formation of future teachers are considered in [44–63].

Analysis of literature on the problems of ICT application in inclusion in education has revealed that this issue, with a focus on pre-school education, is being addressed by T. Kramarenko, K. Bondar and O. Shestopalova [64], O. Kovshar, M. Baditsa and K. Suiatynova [65], M. Marienko, Z. Matyukh, Y. Nosenko, V. Osadchyi, M. Shyshkina, H. Varina and others studies general aspects of ICT integration in inclusion in education [66–68].

However, at the present time a contradiction is traced between the importance and necessity of taking into account individual characteristics of pupils, and the lack of skills for this among a significant number of teachers, which requires changes in the process of methodological training of future teachers.

The outlined concerns also the problem of creating comfortable learning conditions in educational environments for left-handed education applicants.

## 2 Results and discussion

We consider that the readiness to work with left-handed applicants for education is a part of inclusive competence of future teachers.

Our study aims to consider ICT as a tool for developing readiness of future teachers of professional education to work with left-handed education applicants. We proceed from the fact that left-handedness is one of the variants of normal body development, not too common and habitual, but having the right to exist.

Let us note that the phenomenon of ambidextrous (from Latin *Ambi*, "both" and Latin *Dexter*, "right") becomes important in the study as well – it is the ability of a person to equally master both hands. There are about 4.7% of people in the world who are proficient with both hands.

Another widely accepted concept is that of partial dominance of the hemispheres of the human brain, which was formed by R. Sperry (winner of the Nobel Prize in Physiology and Medicine, 1981). According to it, each hemisphere is in a certain way dominant in "its" function of providing cognitive processes.

The work of the brain, with simultaneous work of both the left and the right hemisphere, allows a person to increase the memory capacity, speed and quality of perception and information processing. One of the areas where the phenomenon of ambidexterity is most evident is human learning activity [69].

In order to determine the readiness of potential educators to work with left-handed education applicants we have conducted a survey of future teachers of the second-third year of study at Oleksandr Dovzhenko Hlukhiv National Pedagogical University (the sample is about 300 people).

It was discovered that education applicants are mostly familiar with the diagnostic tools to identify the leading hand in those who learn. We found out about the difficulties that the respondents experienced during their pedagogical practice with left-handed students by analyzing the answers to the question: "What are the difficulties in teaching left-handed education applicants?"

Predominantly among the difficulties the future teachers mentioned the problem of perceiving the demonstration of techniques for performing certain actions or operations.

In order to find out in more detail what students know about the problem of left-handedness and what they see as its essence, an open-ended question was asked: "What is your understanding of the essence of left-handedness?" It is worth noting that a significant number of respondents (about 33.5%) cannot explain its essence. Having worked through the questionnaire we received the following information: 27.2% of the students answered the question "What is your understanding of the essence and content of the concept 'ambidextrous'?" while 19.1% abstained from answering. 53.7% interpreted the above definition as "equal possession of both right and left hand by a man". To the question: "Are there any peculiarities in the organization of the educational process for left-handed students?" a small number of respondents pointed out that on this question they lack knowledge; 62.7% pointed out the peculiarities of demonstrating certain operations; 25.4% pointed out the need for an individual approach to left-handed applicants for education.

To the question "Do you know the method of mirroring in the teaching of left-handed education applicants? Do you have the technology to apply it in practice?" 85% of respondents answered yes, but only 30% had clear guidelines on how to apply it in practice.

Answering the question: "What difficulties can a teacher experience in teaching left-handed applicants for education?" 44.9% mentioned "left-handed people's slowness in performing their tasks", "imperfect spatial orientation", "poor handwriting"; 20.6% – distortion of shapes and proportions of figures during their graphic representation; 9.4% – mirror reading and writing; 25.1% – difficulties in how to help right-handed teachers with left-



handed education applicants, in particular when they write and perform work activities with their left hand and vice versa with left-handed teachers with right-handed education applicants.

On the basis of the mentioned above it is possible to assert that the majority of applicants for professional education are aware of the necessity of an individual approach to left-handed pupils.

The results of the diagnostics of the applicants' practical readiness to work with left-handed students have shown that only a small number of respondents (20.6%) are actually prepared.

Based on the conducted research, it can be stated that there is an urgent need for specialists with appropriate theoretical and practical training, able to effectively teach left-handed pupils in accordance with their individual-psychological features.

Thus, at the initial stage of the research it was determined that the vast majority (more than 80%) of future teachers have limited understanding of the peculiarities of teaching left-handed learners. However, they understand that it is necessary to obtain special professional knowledge in this direction, as they have had experience in communicating or working with left-handed children. The level of empathy found in future teachers allows us to state a positive psychological state of the vast majority of students, which would enable them to more effectively form their inclusive competence.

In pedagogical practice, there is a close relationship between visual and verbal methods. It has been scientifically proven that perception through the first signal system is organically combined with the functioning of the second signal system. However, it is necessary to provide a difference in the methods of using visualization for left-handed and right-handed applicants of education, taking into account that they are in a single educational environment.

In our study we adhere to the opinion of Y. Nosenko [70], who distinguishes three main ways of using ICT in inclusion in education: for compensatory purposes; for communicative purposes and for didactic purposes. During the studies of left-handed learners ICT contribute to differentiation, satisfaction of individual needs, personal development with full inclusion in the educational environment. After all, for left-handed people, the issues of training spatial perception and visual memory are especially relevant.

Scientifically and methodologically proven to work with left-handed education applicants is the "mirror reflection method". In the mirror, the demonstration of work actions is reflected as if inside out. The left hand is the right hand and the right hand is the left hand. In order to introduce this method into the educational process, the teacher must first prepare students for the mirror perception of the work actions in the process of individual work with them. But the quality of the educational process depends on the teacher's ability to divide the labor activities into separate steps, which are to be mastered step by step [71]. These are rather complex, time-consuming processes.

In order to train future teachers to work with left-handed education applicants we have designed training

methods using online software for mirror processing of photo and video materials.

IM2GO is a free online graphics editor (<https://www.img2go.com/>). This service has a wide range of features. It allows you to do many operations with images. You can resize, compress, rotate, mirror, add text and stickers, and apply various graphics filters.

To resize an image you need to upload it by pressing the 'Select File' button and after the image has been uploaded set the required settings.

1. You need the graphic file format.

The most commonly used file format for images is JPG, which gives acceptable image quality with sufficient compression. To select the JPG format, click on the drop down list.

2. Resize.

This setting allows you to select the desired dimensions for the image. Note that the service supports proportional resizing. In other words, it is enough to specify one of the required parameters (length or width) and the image will be resized proportionally.

3. Select resolution (number of dots per square inch).

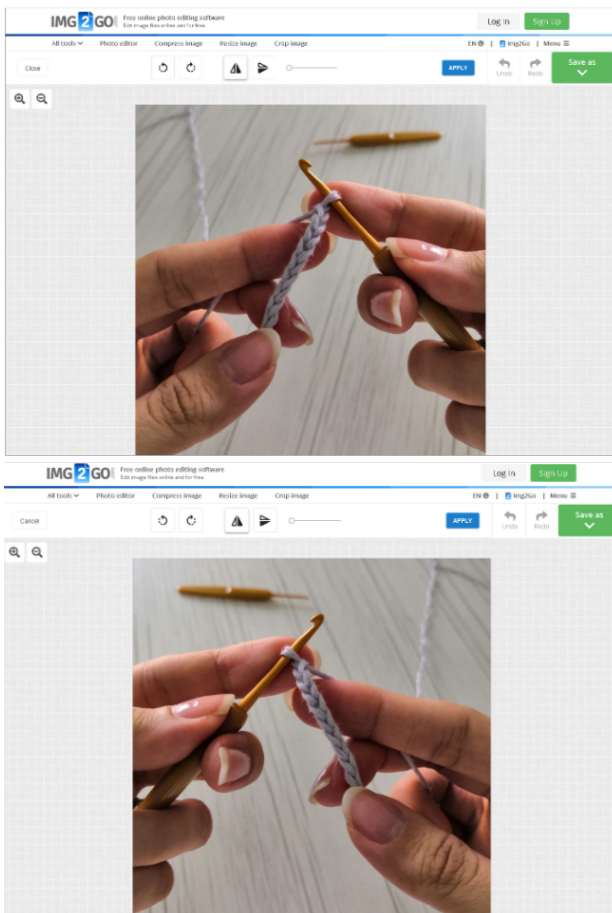
A pixel is a dot in a digital image. Everything we see on a monitor screen or digital camera display is made up of pixels. When referring to digital image resolution or digital image size, it means the number of pixels in the length and height of the image. After selecting the settings, press the start button. A page will open on which you can download the resulting image.

In photography, image mirroring is the process of creating an inverse copy of an image in either the vertical or horizontal axis. Displaying the image horizontally will create a mirror image, while displaying the image vertically will look like reflecting an object in water. The image mapping retains the quality of the original image because the internal pixel information is not changed, except for the pixel order (figure 1).

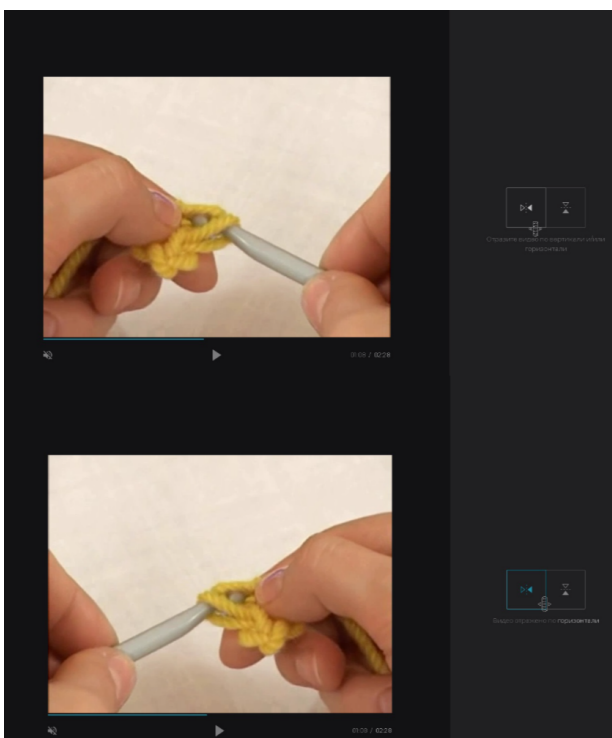
Thus, an image where certain diagrams are made by a right-handed teacher due to mirroring will be understood by left-handed students.

Clideo (<https://clideo.com/>) is an online video formatting program that works with all popular formats like AVI, MP4, VOB, MPG, MOV and more. The app is specially designed for video reflection, so its interface is intuitive and easy to use. You can use the application not only to change the orientation of the video clip but also as a converter to change its format. Using Clideo's settings, you can quickly create YouTube, Facebook, Instagram and Instagram Story videos (figure 2).

Scientists argue that in order to increase the effectiveness of teaching left-handed people, it is necessary to use the capabilities of the right hemisphere as often as possible to make full use of its inherent features: greater speed and emotionality of perception, generalization, integrity, imagery, involvement of involuntary memory. For this purpose it is useful to systematically include manipulations



**Figure 1.** Example of IM2GO operation: image mirroring



**Figure 2.** An example of the Clideo workflow: video mirroring

with models and models in the educational process. It is possible to activate the capabilities of the right hemisphere by skillfully using all kinds of schemes.

Therefore, in our study the software interface was used as an ICT tool for future teachers to assimilate ways of working with left-handed education applicants. The results of the pedagogical experiment showed the effectiveness of the proposed approach.

### 3 Conclusions

The ICT play an important role in addressing the priority tasks of accessibility of training, education and development of education applicants with special needs. Its use as a technical aid, in particular for didactic purposes, contributes to the effective presentation of visibility for left-handed applicants for education, it also increases their motivation to learn subjects, widens the scope of their independent activity and improves their self-esteem.

Further directions of our research are related to the development of methods for the introduction of ICT in the work with left-handed education applicants at the stage of professional (vocational) education.

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## Experimental verification of the pedagogical conditions efficacy to build tolerance among future officers of the National Guard of Ukraine

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**Abstract.** This paper highlights the results of the experimental verification of the pedagogical conditions efficacy to build tolerance among future officers of the National Guard of Ukraine (NGU). The identified pedagogical conditions to build the NGU future officers' tolerance are changes to the educational environment, filling the latter with practical examples of the benefits of being tolerant; faculty development and course officers' professional development in terms of building learners' tolerance; identification of the educational components to form tolerance as a quality, corresponding changes to these components' educational and methodological packages. The experiment has demonstrated that the learners of the mixed groups, both females and males, have higher levels of their tolerance in both CG and EG before and after the experiment. Therefore, the pedagogical conditions for the formation of the NGU future officers' tolerance should also embrace, if possible, the formation of mixed training groups of future officers, including both males and females.

### 1 Introduction

Representatives of military formations and law enforcement agencies perform combat missions in international peacekeeping operations. Surveys of these categories of individuals have identified a potential risk of conflict between servicemen from various United Nations member states. The main causes of such conflicts are: servicemen's lack of knowledge on the ethical norms of behaviour and culture of the nations the representatives of which participate in peacekeeping operations, as well as of the host state on the territory of which the operation itself is being conducted; gender inequality which is treated differently in different countries, as well as the insufficient training of the servicemen in cross-cultural communication. Under certain circumstances, potential conflicts between the servicemen can become a threat. This is especially dangerous in performing combat service tasks and can lead to such consequences as: failure to perform combat missions; loss of the peacekeeping unit personnel; undermined reputation of the mission and the participating states sending their servicemen to man the peacekeeping units; peacekeeping personnel deportation. A significant contribution to solve such issues is made by the system of the personnel training for military formations and law enforcement agencies of Ukraine, in particular, by assigning an important slot within the system to the formation of such a necessary quality for future officers as tolerance.

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### 2 Intent of the research justification

According to N. Skinner and P. Bromley, "strategies for promoting social justice include both individualistic approaches, rooted in the universalism philosophy of human rights, and collectivist approaches, such as group- or issue-specific rights advocated by various social movements. The expansion of human rights education is well documented, but less attention has been given to education for or about other social movements" [1].

The word "tolerant" is interpreted as being able to withstand and endure the adverse effects of any factors; indulgent, lenient toward someone's thoughts, views, beliefs, etc. [2]. The dictionary of social sciences gives a more precise definition: tolerance (Latin *tolerantia* - patience) - 1) tolerance to different views, norms of behaviour, habits, different from those shared by the subject; openness to any ideology, fearlessness of ideas competition; 2) in psychology: complete or partial lack of response to any adverse factor as a result of reduced sensitivity to its influence [3].

The principles of tolerance are stated in the Declaration approved by Resolution 5.61 of the UNESCO General Conference on 16.11.1995 [4]. The document highlights the fact that "tolerance is not only an important principle, but also a necessary condition for peace and social and economic advancement of all peoples". It is also noted that educating for tolerance, formation of learners' tolerance is mandatory in the educational process: "Education for tolerance should be considered an urgent imperative; that is why it is necessary to promote systematic and rational tolerance teaching methods that will address the cultural, social, economic, political and religious sources of

intolerance – major root of violence and exclusion. Education policies and programmes should contribute to development of understanding, solidarity and tolerance among individuals as well as among ethnic, social, cultural, religious and linguistic groups and nations” [4].

The significance of tolerance for professional activity, its formation in different environments, namely educational, was addressed in a number of scientific works, namely by N. Barbelko [5], O. Bryukhovetska [6], Yu. Irhina [7], A. Molchanova [8], O. Troitska [9] and others. Based on the results of their analysis, we come to the conclusion that to form tolerance in learners it is necessary to introduce changes into the educational environment by creating appropriate pedagogical conditions.

We concur with N. Tarasenko that the educational environment of a higher military educational institution should provide comprehensive training and education of servicemen, i.e. fulfill the main goal – to promote high quality professional training for future officers. In terms of modern problems and challenges, the educational environment should be a certain secure zone in which all subjects of the educational process of higher military education would feel fully realized and protected [10]. According to O. Masliy, the pedagogical conditions for the formation of an officer as a specialist determine the circumstances and methods of management and organization of their education and training in higher military educational institutions that make goal-directed development of the individual’s qualities professionally important for this area, and motivate the development of the general capability to establish causal links on the basis of the system complex of professional knowledge, skills, experience, value characteristics and professionally important personal qualities, as well as to adequately influence the functions and tasks performance in this area of military activity [11]. Building positive, constructive relationships is possible only on democratic principles, provided that tolerance is expressed towards each other [12]. Thus, in order to form tolerance in future officers of the National Guard of Ukraine (NGU), changes should be introduced to the educational environment by creating appropriate pedagogical conditions without authoritarianism through organizational, educational and training activities at the level of the group, course, higher educational institution.

### 3 Results and discussion

In order to determine the pedagogical conditions efficacy to build tolerance among future officers of the NGU, a survey of the following stakeholders was conducted: graduates (mostly those who gained practical experience in combat service for at least five years after graduation and became Master Degree candidates at the National Academy of the NGU), learners (cadets), and scientific and pedagogical staff. The focus was on the results of graduates’ surveys. All survey results were discussed at meetings of the departments of the Faculty of Humanities. The discussion also revealed a low level of knowledge on tolerance among scientific and pedagogical staff.

**Table 1.** Learners of the National Academy of the NGU by specialties 253 Command and Control (by the Armed Forces types) and 254 Troops’ (Forces’) Support, who participated in the experiment

Learners of the Academy of the NGU	CG males	CG fe-males	EG males	EG fe-males	Total
by Specialty 253	68	10	84	–	162
by Specialty 254	25	–	20	9	54
Total	93	10	104	9	216

According to the results of the research, the following pedagogical conditions were determined to build tolerance among future officers of the NGU in the process of professional education and training: changes to the educational environment, filling the latter with practical examples of the benefits of being tolerant; faculty development and course officers professional development in terms of building learners’ tolerance; identification of the educational components to form tolerance as a quality, corresponding changes to these components’ educational and methodological packages.

The results of the pedagogical conditions introduction have been checked with the help of a pedagogical experiment as a research method. Based on the analysis of the latest research publications [1, 5–14], we have developed a program of the pedagogical experiment.

*The purpose of the experiment* is to verify the efficacy of the pedagogical conditions of building tolerance among the NGU future officers in the process of professional education and training.

*Independent variables:* pedagogical conditions of building the NGU future officers’ tolerance in the process of professional education and training.

*Dependent variable:* the tolerance level of the NGU future officers in the process of professional education and training.

*Participants in the experiment:* future officers of the NGU.

Taking into account the training groups composition (groups manned with males only; mixed groups manned with males and females), two educational specialties were chosen: 253 – Military Command and Control (by the Armed Forces types) and 254 – Troops’ (Forces’) Support (table 1).

According to table 1, the mixed groups are the control group (CG) – a training group of 19 people (9 males and 10 females), and the experimental group (EG) – a training group of 29 people (20 males and 9 females).

The EG’ and the CG’ learners did not differ significantly concerning the level of knowledge, skills, practical skills, thus ensuring the homogeneity of the groups composition at the beginning of the pedagogical experiment.

In compliance with the theoretical provisions, we conducted the research and experiment in three stages (ascertaining, formative, and control).

Assessment of the level of the NGU future officers' tolerance in the process of professional education and training consisted in the diagnostic assessment conducted with the help of diagnostic tools.

To determine the Cognitive Component, the following methodology was used: "Types and components of tolerance and intolerance" (G. Bardier), "Tolerance Index" (H. Soldatova, O. Kravtsova, O. Khukhlayev, L. Shayherova) [14], Essay "Tolerance is ...".

The Affective-Volitional Component was determined with the help of the Methodology for determining tolerance to uncertainty (S. Badner) [13], "Emotional response scale" (A. Megrabian, N. Epstein), Vitality test (S. Maddy, adaptation by D. Leontev and E. Rasskazova [15]), Assessment of communicative and organizational abilities of the individual (V. Sinyavsky, B. Fedorishin).

The Prognostic-Active Component required the usage of the Methods of diagnostics of communication attitude (V. Boyko) [14], System of exercises, tasks and situations, as well as expert evaluation.

Based on the selected and developed diagnostic methods to assess the formation of tolerance in future officers of the NGU, their levels have been determined as low, average and high.

The learner's level is evaluated as *low* when he/she possesses limited knowledge of the concepts of tolerance, human rights, types of violence and its manifestation, no knowledge necessary to interact with other individuals in a tolerant manner. He/she lacks attention to the interlocutor, shows no interest in the opinion of the other individual. His/her decision-making is based on stereotypes. He/she cannot cope with a strong emotional load, has significant difficulties in establishing contact with other people, categoricalness and conservatism in evaluating people. He/she is unable to hide and smooth out unpleasant feelings in the face of unsociable qualities of partners, to forgive others for their mistakes.

The learner's level is evaluated as *average* on the following conditions: he/she possesses sufficient knowledge of the concepts of tolerance, human rights, types of violence and its manifestation, has weak knowledge necessary to interact with other individuals in a tolerant manner. He/she tries to be attentive to the interlocutor, does not always show interest in the opinion of others, hardly copes with a strong emotional load. He/she is characterized by a weak acceptance and understanding of the individuality of another person. Sometimes there is categoricalness and conservatism in evaluating people. He/she tries to hide and smooth out unpleasant feelings when confronted with unsociable qualities of partners, needs time to forgive others for their mistakes.

The learner's level is evaluated as *high* when he/she possesses very good knowledge of the concepts of tolerance, human rights, types of violence and its manifestation, has very good knowledge necessary to interact with another person in a tolerant manner. He/she is attentive to the interlocutor, shows interest in the other person's opinion, copes well with a strong emotional load, is characterized by the acceptance and understanding of the individuality of another person, non-categorical and non-

**Table 2.** The NGU future officers' tolerance levels formed in the process of professional education and training (persons / percent)

Component	Level	EG before the experiment	CG before the experiment
Cognitive	Low	52 / 46	49 / 48
Cognitive	Average	35 / 31	29 / 28
Cognitive	High	26 / 23	25 / 24
Affective-Volitional	Low	57 / 50	55 / 53
Affective-Volitional	Average	36 / 32	29 / 28
Affective-Volitional	High	20 / 18	19 / 18
Prognostic-Active	Low	46 / 41	41 / 40
Prognostic-Active	Average	36 / 32	35 / 34
Prognostic-Active	High	31 / 27	27 / 26

conservative judgment about people, absence of unpleasant feelings in the face of uncommunicative qualities of partners, ability to forgive others for their mistakes.

The level of a certain component of tolerance formation was determined by the majority of the obtained levels of tolerance formation according to all the methods of this component. The level of tolerance formation of the future officer was determined by the majority of the obtained levels of tolerance formation by the components of readiness.

After identifying the NGU future officers' tolerance level formed in the process of professional education and training according to the defined tools, the results of the ascertaining experiment were attained (table 2). According to the calculations done by the computer program "Statistics in Pedagogy" [16], the following data were obtained.

The pedagogical conditions were introduced in EG as follows.

*The first pedagogical condition.* This requires that when there is an exchange of ideas, opinions, when there is learning and communication, tolerance should become the norm of behaviour and mutual respect. Knowledge of tolerance helps to convince everyone of the appropriateness of their decisions, and includes awareness of the actions consequences, understanding the limits of tolerance, as well as information about possible and necessary alternative actions. However, knowledge alone is not a strong enough stimulus for tolerant behaviour in conflict situations. To this end, it is necessary to develop certain skills that enhance future officers propensity to be tolerant and take appropriate actions. Such abilities include: the ability to dialogue, communicate, intelligently listen to others and formulate one's own views, rights and needs so that the others can understand them; the ability to look at the problem realistically and recognize the position of the other; ability to use the models of constructive and democratic conflict resolution; understanding the fundamental limitations and subjectivity of any interpretive model, the feeling of silently pretending something that is sometimes a prerequisite for conflict.

The choice of methods, means or technologies of learning is important for the effective education of a tol-

erant personality of a serviceman in the system of higher educational institutions. Interactive teaching and learning methods have the greatest educational potential: role play, discussion, project method, “fish bowl”, brainstorming, Synanon method, etc. which allow not only to develop creative potential, but also to develop a tolerant personality with developed qualities: responsibility, independence, adequacy of self-esteem, willingness to take risks, creativity.

For example, learning with the use of the Synanon method takes place in the form of a game using the so-called “hot chair”. Each participant of the lesson takes a seat on a chair in front of the audience and is interviewed by the groupmates on a specific educational topic (i.e. the task of deepening and systematizing theoretical knowledge is being solved). At the same time, the members of the group have the right to “provoke” him/her to aggressive behaviour with their questions, and his/her task is to behave tolerantly. Thus, in addition to the professional knowledge, the participants of the training should learn about emotional balance, tolerance to negative emotional actions, improve their character traits, namely volitional qualities.

In the process of interactive learning, as a rule, actions are analyzed, behaviour patterns change, knowledge and skills are more consciously acquired, so it makes sense to say that interactive methods are strong not only as a means of improving learning but also as a means of strengthening educational influences.

*The second pedagogical condition.* In the higher educational institution, the development of the system of internal quality assurance receives considerable attention, in particular concerning the professional development of the faculty [17]. In accordance with the requirements of regulations at the National Academy of the NGU, the opportunities have been created for advanced training in the formation and development of personal tolerance and the ability to develop tolerance in other members of the academic community, including learners. For this purpose, online courses of the Prometheus platform is used, namely the course “Culture of tolerance: how to build a society that is comfortable for all” [18]. Corresponding changes have been introduced to the curricula of the faculty development program “Staff support of the educational activities of a higher military educational institution” (the mentioned above issues are addressed within the modules “Pedagogical and Professional Psychology” and “Professional Culture of Higher Military School Lecturer”) [19], and “Faculty development of scientific and pedagogical and pedagogical staff for the educational process enhancement” (the mentioned above issues are addressed in the modules “Topical problems of psychology of higher education” and “Strategic communications in educational process”) [20]. Despite the fact that there are restrictions for scientific and pedagogical staff to study and do internship abroad, the representatives of the higher educational institution have improved their skills abroad on the development of tolerance in society. Almost all scientific and pedagogical staff who realize the educational components in the training groups of the EG, as well as course officers

of these groups, have successfully completed at least one of these courses.

*The third pedagogical condition.* We have chosen a socio-psychological training as a means of purposeful formation of tolerance.

In general, the philosophy of education considers training as an effective technology of active learning, in the process of which professional qualities of the individual are quickly formed, the individual quickly adapts to a new environment along with interpersonal communication active development and implementation of the requirements of society and the state as for the individual.

We propose to apply the training that affects the development of the NGU future officers’ tolerance in the course “Psychology of Extreme Activities”. The purpose of the training is to consolidate the future officers’ knowledge of the components of tolerance, teach them to understand and respect their activities, be tolerant in communication, show the importance of tolerant behaviour when interacting with others, develop skills of conflict-free interaction, endurance, self-control, ability to tolerate unfavorable influences for a long time.

The training includes the exercise with the following purposes: psycho-diagnostics and assessment of personal tolerance; development of a sense of mutual understanding among the participants of the process; development of social perception; development of the ability to tolerantly (not aggressively) express their negative feelings.

The proposed training is not able to solve all the tasks related to the formation of the skills that allow confident and conflict-free performance in fulfilling the tasks of the NGU, but it can help the NGU servicemen to skillfully regulate their interaction with the activity environment [21].

After examining the NGU future officers’ tolerance formed in the process of professional education and training according to the defined tools, the results of the experiment were attained. The results of diagnostic assessment of the NGU future officers’ tolerance built in the educational process and training of the EG and the CG are given in table 3.

The empirical data analysis shows positive dynamics of tolerance among the NGU future officers in the process of professional education and training in the EG. It has been found out that during the experiment the number of the EG learners with the low level of tolerance among the NGU future officers has significantly decreased (by the cognitive component – by 27%, by the affective-volitional component – by 25%, by the prognostic-active component – by 19%). At the same time, the number of the NGU future officers with the high level of tolerance has increased (by the cognitive component – by 38%, by the affective-volitional – by 19%, by the prognostic-active – by 22%). In the CG the changes are insignificant.

During the experiment, it came out that both female and male learners of the mixed groups possess higher levels of tolerance in both CG and EG before and after the experiment. From this perspective, the formation of mixed training groups of future officers, including both males and females when possible, should be added to the pedagogical



**Table 3.** Dynamics of the NGU future officers' tolerance levels formed in the process of professional education and training (persons / percent)

Component	Level	EG after the experiment	EG dynamics	CG after the Synanon method	CG dynamics
Cognitive	Low	21 / 19	-31 / -27	43 / 42	-6 / -6
Cognitive	Average	23 / 20	-12 / -11	26 / 25	-3 / -3
Cognitive	High	69 / 61	43 / 38	34 / 33	9 / 9
Affective-Volitional	Low	29 / 26	-28 / -25	49 / 48	-6 / -6
Affective-Volitional	Average	43 / 38	7 / 6	31 / 30	2 / 2
Affective-Volitional	High	41 / 36	21 / 19	23 / 22	4 / 48
Prognostic-Active	Low	24 / 21	-22 / -19	35 / 34	-6 / -6
Prognostic-Active	Average	33 / 29	-3 / -3	34 / 33	-1 / -1
Prognostic-Active	High	56 / 50	25 / 22	34 / 33	7 / 7

conditions for the formation of the NGU future officers' tolerance.

#### 4 Conclusion

The comparative analysis of the experimental data shows the increase in the percentage of the EG learners (compared to CG) with the high level of the NGU future officers' tolerance in the educational process (by the cognitive component – by 38%, by the affective-volitional component – by 19%, by the prognostic-active component – by 22%).

While comparing the results of the experiment before and after, it was obtained: in the CG the empirical values of the criterion  $\chi^2$  are lower than the critical ones, the characteristics of the compared groups coincide at the level of significance of 0.05; in the EG the empirical values of the criterion  $\chi^2$  are higher than the critical ones, the reliability of the difference in the characteristics of the compared groups is 95%.

Thus, the results are reliable and give grounds for the conclusion that the differences in the values of tolerance levels among the NGU future officers in the process of professional education and training in the EG and the CG are not accidental, and highlight the effectiveness of the identified pedagogical conditions to build the NGU future officers' tolerance:

- changes to the educational environment, filling the latter with practical examples of the benefits of being tolerant;
- faculty development and course officers' professional development in terms of building learners' tolerance;
- identification of the educational components to form tolerance as a quality, corresponding changes to these components' educational and methodological packages.

During the experiment, we noticed that the learners of the mixed groups, both females and males, have higher levels of their tolerance in both CG and EG before and after the experiment.

Therefore, the pedagogical conditions for the formation of the NGU future officers' tolerance should also include, if possible, the formation of mixed training groups of future officers, including both males and females.

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## Modelling of pedagogical technologies on the basis of activity approach

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**Abstract.** The article identifies the main starting points for modelling pedagogical technologies based on the activity approach, namely: understanding of pedagogical technology as a scientifically sound activity aimed at forming the personality of the learner during the educational process by means of certain educational material; interpretation of pedagogical modelling as a process of creating such a reflection of the educational process that could reproduce a pedagogical object or process and replace it; the result of pedagogical modelling are images, forms of objects of pedagogical design. These are the relevant documents: concepts, state educational standards, curricula and programs, lesson plans, algorithms for action in lessons, diagrams, tables, etc.; drawing up a model of pedagogical technology based on the activity approach is an algorithm of actions, which includes: determining the subject of activity of the teacher and the student, selection of means of their activity, determination of conditions of pedagogical process, establishment of activity results. The generalized algorithm of drawing up of pedagogical technology model on the basis of the activity approach is presented by such steps: definition of a subject of activity for the teacher and the student separately; selection of means of their activity of the teacher; drawing up the process of educational activity of the teacher and the cognitive process of the student; determining the conditions for this process and establishing the results of this activity. The technology of creating a model for the implementation of interdisciplinary links based on the activity approach is represented by two stages: the creation of a model of their content and a model of the implementation process. The result of modelling the content of interdisciplinary links is to set goals for the use of knowledge from one subject in the study of another. The result of modelling the process of realization of interdisciplinary connections is the integral knowledge of the object of study formed in the student.

### 1 Introduction

At the present stage of development of pedagogical science a significant place in the organization and implementation of the educational process is given to pedagogical technologies. Pedagogical technologies have not become a completely new phenomenon in science. Previously, they were used in the form of principles, tools, conditions and even teaching methods. Examples include the development of problem-based or group learning, interdisciplinary connections, and so on. But in accordance with the achievements of pedagogical science, related to the integration of scientific knowledge, the involvement in pedagogy of knowledge from other scientific fields, scientists have managed to reach a new level of pedagogical development – technology development. Moreover, the compilation of technologies involved scientifically sound development of the organization of the educational process, ie design.

Design technology was proposed by J. Dewey [1]. The foundations of the design of educational technologies in Ukrainian pedagogy were laid by A. Makarenko [2], who sought to deprive the educational process (including its educational component) of spontaneity through the

use of thoughtful educational actions and their sequence. V. Sukhomlynsky paid great attention to pedagogical design, developed the ideas of A. Makarenko, emphasizing that the main area of connection of pedagogical theory and practice is human design as a result of skillfully constructed educational process [3], i.e., as a result of pedagogical technologies.

Today the work of many scientists is devoted to the problem of development of pedagogical technologies, models of their creation and use. In particular, in the work [4] noted that the success of pedagogical modelling depends on the existence of a theory that describes the phenomenon to be modelled, as well as the degree of formalization of the provisions of this theory.

The analysis of scientific and educational-methodical works of scientists shows that modelling of pedagogical technologies is presented by them on the basis of one of methodological approaches – system. But along with the systematic approach in pedagogical research, activity occupies a prominent place, because the educational process is one of the activities. Thus, modelling of pedagogical technologies should be considered not only on the basis of system, but also on the basis of activity approach. These circumstances led to the goal of this study.

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The purpose of the article is to reveal the essence of modelling pedagogical technologies on the basis of the activity approach. The research tasks:

1. To reveal the main starting points of modelling of pedagogical technologies on the basis of the activity approach.
2. To offer the generalized algorithm of modelling of pedagogical technologies on the basis of the activity approach.
3. Give an example of an algorithm for modelling one of the pedagogical technologies based on the activity approach – the technology of implementation of integrative learning (interdisciplinary links).

## 2 Results

First, we will focus on the initial methodological positions of modeling pedagogical technologies based on the activity approach.

*The first position.* In the scientific literature, pedagogical technology is considered by scientists in many ways and widely. Philosophers define technology as a form of motion of matter (technological form of motion of matter), as a progressive and human-controlled natural and social set of processes of purposeful change of various forms (mechanical, physical, chemical, biological, etc.), matter, energy and information flowing in systems of technology in accordance with these specific laws of structure and functioning [5].

Modern scientists give the following general definition of the science of technology: “technology is a science that studies the processes of transformation of some primary entities into entities that meet human needs while minimizing costs” [6]. M. Castells, one of the founders of the theory of the new sociology of the city, defined technology as “the use of scientific knowledge to determine ways of making things in a reproductive manner ...” [7].

Given the modern encyclopedic definition of “technology” should be understood as a field of human activity, the function of which is the development and theoretical systematization of objective knowledge about transformational activities, which contribute to the formation of scientific ideas about how to implement it.

Pedagogical technology is considered by scientists from different points of view [8–15]. We assume that since technology is interpreted as a scientifically sound activity to create a particular product, the pedagogical technology should be considered as a scientifically sound activity aimed at forming the personality of the learner by means of educational material. Moreover, the main thing in pedagogical technology, as scientists say, is the development and detailing of instrumental aspects of the pedagogical process.

I. Smolyuk and S. Smolyuk present pedagogical technology as “a project (model, system) of the educational process that determines the structure and content of educational and cognitive activities of students, their own vision

of the need to become a high level professional”. [16]. The essence of pedagogical technology is presented quite fully by M. Mykhailychenko and M. Rudyk. Scientists note that created and adapted to the needs and capabilities of the individual and society, pedagogical technology is a theoretically sound educational system of personal and professional development in an educational institution [17].

So, based on the fact that technology is a scientifically sound activity to create a certain product [5, 6, 18–25], and the educational process involves the comprehensive development of man as a person and the highest value of society, its talents, intellectual, creative and physical abilities, the formation of values and competencies necessary for successful self-realization [26], we understand pedagogical technology as a scientifically sound activity, aimed at forming the personality of students during the educational process by means of certain educational material.

*The second position.* The activity of determining adequate pedagogical solutions, the effectiveness of which has theoretical and practical confirmation, as well as their detailed, consistent and well-founded presentation is considered by scientists as a process of pedagogical design [8, 27–30]. It is noted that pedagogical designing of activity of subjects of education is directed on construction of models of transformation of pedagogical reality, and essence of this process consists in revealing and the analysis of pedagogical problems and the reasons of their occurrence, revealing of value bases and construction of strategies of education, search for methods and means of their implementation, etc.

N. Morse considers two levels of pedagogical design [31]: the first as one of the functions of pedagogical activity (perspective planning of tasks and ways of their solution), the second as a separate type of activity having its own structure (diagnosing the object of design, conceptual modelling, project management system, stages project implementation, criteria for evaluating the success of the project). Pedagogical design is considered by scientists [28, 31, 32] as a special kind of creative activity. Such activities include planning, programming, modelling, designing and predicting actions or consequences. Planning in the design process involves determining a set of activities for the relevant activities.

Programming involves determining the course of events in time and the order of the rules that must be followed to carry out the planned. Modelling – the creation of a system that is in objective accordance with the real object and which is able to replace it in a certain respect and gives the necessary information about the object itself. Design – the creation of a prototype of a certain object as a purposeful embodiment of innovative ideas, patterns of the educational process, principles based on knowledge of psychology, partial methods, pedagogical technologies and more. Forecasting is predicting the future state of an object or phenomenon based on the analysis of its past and present.

The result of pedagogical design is a set of documents, which includes a scientific justification of the design object in the form of a prototype of the pedagogical (educational) process. Such a prototype of the educational pro-



cess is a model of projected technology. Thus, the main task in the design of pedagogical technology is to build a model of the educational process that could guarantee the teacher the effective achievement of goals. Thus, pedagogical modelling is the creation of a reflection of the educational process that could reproduce the pedagogical object or process and replace it so that new information can be obtained.

*Third position.* Since the purpose of designing pedagogical technology is to create a prototype of the educational process, the result of its construction is a model of this process, and modelling is one of the methods of pedagogical design.

In philosophy, the concept of “model” is defined as a representative or substitute for the original in cognition or in practice. Scientists note that the model is created to represent objects, phenomena or processes that do not yet exist in reality, or for some reason are not available. The model allows you to create images of these objects, phenomena or processes, to highlight some of their essential aspects, to simulate the real processes of future activities, to make an informed choice of one of the alternative solutions to problems, and so on. The model can take the form of a diagram, description, physical structures or formulas similar to the object (phenomenon) and reflects or reproduces in a simpler form the structure, properties and relationships between the elements of the object (phenomenon) [5, 8, 27, 33–39].

The model is considered by scientists as a means of cognition, and the creation of a model – modelling – by the method of scientific cognition [8, 27, 28, 32]. Modelling as a method of scientific cognition is a method of reproducing the characteristics of the object under study in an artificially created for its study reflection.

There are two types of models: substantive (material) and symbolic (figurative and formal). Formal ones, in turn, are divided into statistical, abstract-logical, and others. The structural elements of the abstract-logical model in pedagogy are the purpose, tasks, approaches and principles, stages of implementation, components, levels of formation, result and conditions of implementation. When modelling, all these elements are to be determined.

Pedagogical model is a mental system that mimics or reflects certain properties, features, characteristics of the educational process or the principles of its internal organization or functioning and is presented in the form of a certain form inherent in socio-cultural practice [8, 27, 28, 32]. That is, the pedagogical model is a reflection of the object of pedagogical design. According to the content, structure and functions of modelling objects, scientists [40] determine the semantic, structural and functional models. The semantic model reflects the content of the object of pedagogical design, the structural model reflects the structure and relationships between the components of the object, the functional reflects its functions. These models can be combined, for example, structural and functional in structural-functional.

The objects of pedagogical design include pedagogical systems, pedagogical process, pedagogical situations, as well as pedagogical technologies and educational environ-

ment. In the works [32], [28] etc. objects of pedagogical design are presented as follows.

Pedagogical systems include such components as: teachers, students, material and technical subjects, processes, etc. According to their scale, scientists distinguish the following pedagogical systems: small (subsystems of educational institutions: educational, upbringing, methodical, etc.), medium (activities of the educational institution as a whole), large (education system of the city, district, region), ultra-large (education systems regions, republics, countries). They also define special pedagogical systems, which include the subjects of the educational process. The personality of the student is considered as a leading link in the pedagogical system.

The pedagogical process includes goals, objectives, content, methods, forms, tools that promote the development of students and teachers in their interaction. Its design involves combining these components into a single whole.

Another object of design is the pedagogical situation, which is part of the pedagogical process. The pedagogical situation characterizes the pedagogical process at a certain moment, which may arise by chance or be constructed specifically.

Pedagogical technologies reflect the sequence of actions of the teacher using different methods, forms and means of teaching or education.

The educational environment includes educational facilities, their equipment and design. The design of the educational environment involves the creation of new types.

The created model is a scientific result, “new knowledge obtained in the process of basic or applied research and recorded in the form of a report, scientific work, scientific report, scientific report on research work, monographic research, scientific discovery, etc.” [41]. Therefore, images of pedagogical design objects should be considered as a result of pedagogical modelling. In this way, scientists identify forms of pedagogical design, which include the following documents: concepts, state educational standards, curricula and programs, comprehensive plans and work programs, lesson plans, algorithms for lessons, diagrams, tables, job descriptions, qualifications, etc. These forms are models of the corresponding objects.

*Fourth position.* In the scientific literature, human activity is defined as a process of active interaction of the subject with the object, in the process of which the subject meets its needs and achieves the goal [34, 42–44], i.e. expediently transforms, changes certain objects or subjects. As a result, we interpret the activity approach as a scheme of scientific knowledge, which is based on the consideration of the processes of transformation, change of certain objects (subjects). Since human activity is always appropriate and in some way organized, it is technological, functional (O. Rakitov) [45]. The structural components of such human activity in terms of general technology, we determine the subject of activity, means, process, organization (conditions) and the result of its implementation. Such structural components of activity were singled out by V. Davydov [42].

Activities that involve a certain movement, a consistent change of stages, a set of purposeful actions by scientists are interpreted as a process [14, 29, 42, 43, 46, 47]. Accordingly, the pedagogical process should be defined as activities aimed at achieving educational goals. It is known that teachers (provide training) and students (perform training) take part in the pedagogical process [43, 46]. Thus, since the educational process is a purposeful, consistently organized interaction of teachers and students, mediated by the content of their joint activities, during which the tasks of education are solved [43, 46], then to design this activity, to develop a pedagogical model should be separately for the teacher and separately for the student. This approach ensures the implementation of the pedocentric approach in the educational process (J. Dewey [48] and others).

According to the general structural components of activity the subject of activity of the teacher is personal qualities of the applicant, and the subject of activity of the applicant – system of knowledge, the maintenance of training. The means of activity of the teacher are the means of pedagogical action: oral speech, visual aids, system of tasks, etc., and the means of activity of the student – textbooks and manuals, notebooks, computer, etc. The process of the teacher's activity is determined by the technology of organization of the cognitive activity of the student, and the process of the student's activity is determined by the stages of his cognitive activity. The conditions of the pedagogical process by the teacher are compliance with the requirements for its organization, taking into account the psychological and physiological characteristics of the student, knowledge of educational material and appropriate competencies, etc., and for the student it is the presence of motives for educational activities, teaching aids (textbooks, manuals, tasks, etc.) etc. The result of the teacher's activity and the result of the student's activity also differ: the result of the teacher's activity is the formed personal qualities of the student, the result of the student's activity is his education (preparedness), level of mastering competencies, level of culture in a certain educational field.

However, it should be emphasized that a clear definition of the subject, means, processes, conditions of organization and outcome for each subject of the pedagogical process separately makes it possible to more fully understand and define the features and clearly design its course.

Thus, given the above model of pedagogical technology based on the activity approach can be represented by the following algorithm:

1. Defining the subject of activity. For the teacher as a subject of activity personal qualities of each pupil act. For the student – a system of knowledge, methods of activity, values (competencies), etc. [43, 46].
2. Selection of means of activity. For the teacher as a means of activity are a variety of teaching aids, teaching methods and other supporting materials. For the student – means and methods of learning.
3. Drawing up the process of activity – building a methodology for the implementation of the educa-

tional process (lesson or fragment of the lesson). For the teacher – this is a scientifically sound sequence of use of tools and application of methods and techniques for organizing the educational activities of the applicant. For the student – the stages of learning, mastering the methods of activity and the formation of personal qualities: perception, awareness, understanding, use and consolidation of educational material.

4. Determining the conditions of the pedagogical process. For the teacher – is the definition of circumstances that determine the organization and course of the process of forming personal qualities of each student (adherence to didactic and specific principles of the pedagogical process, structuring educational material, focus on the area of immediate development, etc.). For the learner – these are the circumstances that determine the organization of the process of cognitive activity – learning (attention, interest, motivation, etc.).
5. Establishment of results of activity. For the teacher, such results are formed certain personal qualities of the student. For the applicant – the level of education (preparedness) on certain issues (educational topics), the formation of his culture and so on.

As an example of creating a model of pedagogical technology based on the activity approach, we give the sequence of compiling the technology of implementation of integrative learning, which in modern pedagogy has not yet found a sufficiently complete development. The concept of integrative learning is used in several aspects, namely:

- as a term to define structures, strategies and activities aimed at combining general and profile subjects, academic disciplines and practical experience [49];
- as a process of developing the ability to learn, evaluate and make connections between significantly different concepts, areas of activity, or contexts [50];
- as a property that the student acquires during training and which consists in the ability to build simple connections between different ideas and experiences, the ability to combine and transfer learning experiences in new, complex situations that arise during and after training [51].

One of the cases of integrative learning is the realization of connections between academic disciplines (between subject connections). Interdisciplinary links are a reflection of integration processes in science [52], which is projected on the systematic and purposeful implementation of links between individual subjects [53].

Inert use of interdisciplinary connections is observed in the educational process. O. Globin identified objective and subjective causes of this condition: insufficient methodological basis; discrepancy in the time of studying related material in lessons in different subjects; different interpretations of concepts in different subjects; labor-intensive and significant time spent in preparing teachers

for interdisciplinary classes; inefficiency of one-sided use of interdisciplinary connections; lack of recommendations in the educational standard and programs for the implementation of interdisciplinary links. Subjective reasons include: weak motivation of school teachers to implement interdisciplinary links; insufficient theoretical and practical training of teachers to conduct classes using interdisciplinary links; practical lack of joint methodological associations of teachers [54].

In the holistic system of realization of interdisciplinary connections O. Globin identified the components: methodological, didactic, organizational-methodical, psychological-communicative, scientific-methodical.

The methodological component includes theoretical principles of interdisciplinary relations (their content and essence, types, classifications, functions, main components, methods of implementation, etc.), content and structure of related subjects, modern educational technologies [54].

The didactic component includes the goal; task; principles; substantive basis (general concepts, laws and theories); activity basis (general educational and cognitive skills); general research methods (observation, experiment, hypothesis and theory construction, modelling); means and methods of making interdisciplinary connections in educational classes; forms of organization of educational classes that promote the implementation of interdisciplinary links; system of tasks (including interdisciplinary) of applied (practical) content.

The organizational-methodical component includes the implementation of conceptual (substantive) and temporal coordination of the study of related subjects; ensuring continuity in the formation of understanding of general concepts, methods, study of laws and theories; application of general approaches to the formation of skills and abilities of educational work; disclosure of relationships between phenomena of different nature studied by related subjects; anticipation of difficulties and mistakes; defining a system of goals and objectives; plan educational work; planning of various forms of organization of educational and cognitive activities; organization of educational and cognitive activities depending on the purpose and tasks; organization and management of the subject groups and electives; formation of cognitive interest and motivation; mastery of methods of conducting complex (integrated) training sessions.

The psychological-communicative component includes the knowledge of psychological characteristics, individual needs of students, psychological foundations of communication, psychological and pedagogical conditions for the formation of knowledge and skills in individual subjects, as well as the ability to navigate in psychological situations, to establish interpersonal relationships.

The scientific-methodical component includes the ability to adapt new pedagogical technologies for the implementation of interdisciplinary links, to improve traditional methods of solving problems of interdisciplinary content; to organize self-educational work on mastering the system of interdisciplinary connections; analyse and

summarize their own experience and implement the positive experience of colleagues in their implementation.

In view of the above and our own observations, we can draw such generalized but thorough conclusions. First: the inert use of interdisciplinary links by teachers in practice is due to their lack of understanding of the content and results of activities in the modelling and implementation of these links, ie the essence of the technology of implementation. Second: despite the fact that the implementation of interdisciplinary links in the educational process is an activity, in modelling the content and organization of cognitive activity of students for their implementation, methodologists and scientists do not use the structural components of the activity. Accordingly, the technology of implementation of interdisciplinary links requires refinement.

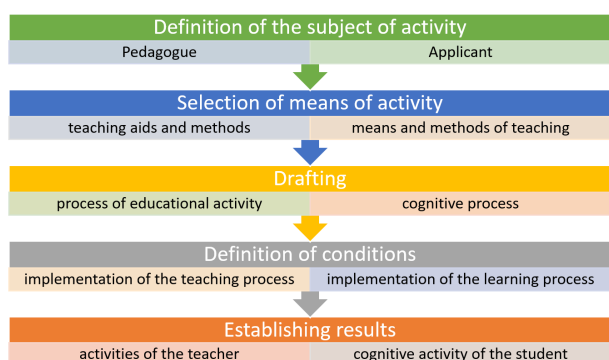
Thus, as we know, interdisciplinary connections are such relations of connection between educational subjects (disciplines), which determine the content of knowledge of students in some subjects by the content of knowledge from others, related ones. In our previous work [55] it is shown that the implementation of interdisciplinary links involves two stages. In the first stage, the teacher has to establish (plan) them, ie to determine probable models of the content of connections. In the second stage – to determine the model of organization of cognitive activity of students in the process of implementing interdisciplinary links. And the construction of a model of the content of interdisciplinary connections on the basis of the activity approach involves the definition of such characteristic features as the grounds, conditions of implementation and characteristics of the result of communication – the goals of knowledge transfer.

Yes, the subject of communication for subjects is the grounds for its existence. When modelling the content of interdisciplinary links as such a basis, it is necessary to identify common to related subjects objects, processes or methods of study.

The conditions for the existence of interdisciplinary links are the presence in each of the related subjects of the components of knowledge about the common object of study. Such components of knowledge are: scientific facts, concepts, laws and patterns, methods of cognition, and so on. Therefore, when modelling the content of interdisciplinary connections, it is necessary to determine the components of knowledge about the common object of study from the subject being studied and from related subjects with which the connection is established.

A means of modelling the content of interdisciplinary links is a table that includes three columns: the first column records the components of knowledge about the common object of study from the subject being studied. In the third – the components of knowledge about the common object of study in a related subject (subjects). And in the second - the purposes of transfer of knowledge from one subject to another are defined.

According to the third component of the activity approach, the process of activity is the process of drawing up a plan of interdisciplinary links, which includes the following stages:



**Figure 1.** Algorithm for compiling a model of pedagogical technology based on the activity approach

- 1) identification and fixation in the table of a common subject for the studied subject and for a related subject of the object, process or method of study;
- 2) identification of the components of knowledge about the common object, process or method of study according to the curriculum of the studied subject and their fixation in the first column of the table;
- 3) identification of components of knowledge about a common object, process or method of studying the program of a related subject of the subject and fixing them in the third column.

The result of creating a model of interdisciplinary links is to determine the cognitive goals of transferring certain components of knowledge about a common object of study from one subject to another (such goals are: justification, generalization, specification, interpretation, illustration and combination (integration) of knowledge) and detection of duplication and violations of continuity between subjects, clarification and improvement of their content.

In [55] it is also shown that the process of realization of interdisciplinary connections involves the definition of stages and levels, didactic tools and techniques, conditions and results of their implementation (figure 1).

According to the activity approach, the first step of the algorithm for modeling the process of realization of interdisciplinary relations should be to determine the subject of interdisciplinary relations. Such a subject is the personal qualities of students, in particular the ability to think logically, transfer knowledge and more.

The second step is the selection of didactic means of making interdisciplinary connections, which can be: oral explanation; printed teaching aids (textbooks, reference books, manuals, posters, etc.); graphic tools (schemes of manifestation of laws and theories, structural-logical schemes, network schedules of curricula); interdisciplinary questions, problem and tasks (questions and tasks for substantiation, generalization, concretion, illustration, interpretation, integration of knowledge; technical tasks; complex tasks).

Third step is the construction of the content of the cognitive process for the implementation of interdisciplinary

links, which includes the following stages: updating the knowledge of the learner in the basic (related) subjects (topics); updating of new knowledge by the teacher; setting tasks for the transfer of basic knowledge to new ones; solving problems on the transfer of knowledge of the student by the teacher or under the guidance of the teacher, or the student himself. The designer (teacher) must also determine the relevant knowledge of the learner in the basic (related) subjects (topics) for their actualization and new knowledge that he should offer on this subject; tasks for the student to transfer knowledge from related subjects to new studied ones; answers to these problems.

The fourth step of the algorithm is to determine the conditions for the implementation of interdisciplinary links, which are determined by the degree of independence of the student in performing educational tasks, the rules of joint activities of teacher and student and other circumstances that the teacher must provide. Depending on the degree of independence of the student to manage his cognitive activity for each case, the teacher must choose one of four levels: explanatory-illustrative, reproductive, partial-search or creative.

After that, according to the levels of independent activity of students should choose methods and techniques for organizing the cognitive activity of the student. According to the stages of interdisciplinary links, the following methods and techniques are:

- at the explanatory-illustrative level: reminders, statements, rhetorical questions, explanations;
- on the reproductive: asking questions or instructions on educational material in related subjects, teaching this material, asking questions and tasks to control the answers of students;
- in part-search: instructions or references to educational material in related subjects, presentation of this material by the teacher, teacher's instructions and control of tasks;
- on the creative - with the help of instructions and control of tasks.

The last step of the algorithm of the process of interdisciplinary connections is to determine the results of this process, which should be formed in the student's integrated idea of the object of study. That is, the student must demonstrate sound, generalized, concretized, integrated knowledge of the subject or illustrate them, as well as knowledge that can interpret the material studied in other subjects.

### 3 Conclusions

Thus, the main initial methodological positions in the modelling of pedagogical technologies based on the activity approach are:

- understanding of pedagogical technology as a scientifically sound activity aimed at forming the personality of the learner during the educational process by means of certain educational material;



- interpretation of pedagogical modelling as a process of creating such a reflection of the educational process, which could reproduce the pedagogical object or process and replace it so that new information can be obtained;
- the result of pedagogical modelling are images, forms of objects of pedagogical design, which are the relevant documents: concepts, state educational standards, curricula and programs, comprehensive plans and work programs, lesson plans, algorithms for lessons, schemes, tables, job descriptions instructions, qualification characteristics, etc. These forms are models of the corresponding objects;
- modelling of pedagogical technology on the basis of activity approach is presented by algorithm of actions which includes definition of a subject of activity of the teacher and the pupil, selection of means of their activity, definition of realization conditions of pedagogical process, establishment of results of activity.

The technology of creating a model for the implementation of interdisciplinary links based on the activity approach includes the creation of a model of their content and a model of the implementation process. The result of modelling the content of interdisciplinary links is to set goals for the use of knowledge from one subject in the study of another. The result of modelling the process of realization of interdisciplinary connections is the integral knowledge of the object of study formed in the student.

The generalized algorithm for compiling a model of pedagogical technology based on the activity approach is represented by the following steps:

1. Defining the subject of activity for the teacher and the student separately.
2. Selection of activity means of the teacher (means and methods of teaching) and means of activity of the applicant (means and methods of teaching).
3. Drawing up the process of educational activity of the teacher and the cognitive process of the student.
4. Determining the conditions for the implementation of the learning process by the teacher and the learning process of the student.
5. Establishing the results of the teacher and the results of cognitive activity of the student.

Prospects for further research in this area are associated with the detailed development of models of basic pedagogical technologies based on the activity approach.

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