Use of AR/VR Technologies in the Development of Future Specialists' Stress Resistance: Experience of STEAM-Laboratory and Laboratory of Psychophysiological Research Cooperation

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Abstract. The scientific article deals with the analysis of peculiarities of the use of innovative AR/VR technologies in the process of developing future specialists' stress resistance. Based on the analysis of the introduction of AR/VR technologies in the context of the implementation of a competency-based approach to higher education; modern studies on the impact of augmented reality on the emotional states and physiological features of a person in a stressful situation, the experience of cooperation of students and teachers at the Laboratory of Psychophysiological Research and STEAM-Laboratory has been described. Within the framework of the corresponding concept of cooperation, an integrative approach to the process of personality's stress resistance development has been designed and implemented. It is based on the complex combination of traditional psycho-diagnostic and training technologies with innovative AR/VR technologies. According to the results it has been revealed that the implementation of a psycho-correction program with elements of AR technologies has promoted an increase of the level of personality's emotional stability and stress resistance. The level of future specialists' situational and personal anxiety has decreased; the level of insecurity, inferiority, anxiety about work, sensitivity to failures has also decreased; the level of flexibility of thinking and behavior, ability to switch from one type of activity to another one has increased; general level of personality's adaptive abilities has also increased. The perspectives of further research include the analysis of the impact of AR/VR technologies on the future professionals' psychological characteristics in order to optimize the process of implementing a learner-centered approach into the system of higher education.

Keywords: AR/VR technologies, Stress resistance, Professional training.

1 Introduction

Trends in the development of modern society, enhancement of computer technologies, globalization and informatization affect all spheres of social life, including higher education. The significance, aim and mission of modern education is not just the acquisition of basic knowledge and development of necessary competencies, it is the also a development of a cultural code, an independent approach to the acquisition of new knowledge, cultural values, new forms and activities. Information culture and awareness of the use of innovative augmented reality elements are some of the most important and basic competences in the process of training of future specialists, who are competitive, capable of self-realization, professional and emotional stability in the world of unstable socio-economic conditions of society. The use of the opportunities of augmented reality in education can regenerate the process of visual perception of necessary information, simultaneously involving person's cognitive and sensory systems in this process. Reproduction of some processes for visual representation in real dimensions gives an opportunity for complex perception and holistic immersion into the phenomenon under study [21]. The key characteristics of the modern educational process in higher education are: digitalization of the educational environment with a focus on the individualization of the educational process; development of adaptive technologies, technologies of electronic and mobile learning, means of identification and personalized access. All these characteristics contribute to the design of educational process models based on the development of the individual educational route of a student [16]. In accordance with the transformational information processes in education, there is a change of competence-based, personality-oriented model of future specialist's training. But the issue of the research of impact of innovative AR technologies on the mental characteristics and adaptive abilities of the individual remains quite extensive and uncovered [35]. A number of issues related to the identification of the features of the use of modern AR technologies and VR technologies for the development or stimulation of certain mental functions raises the need to create a continuum of multidisciplinary research programs [28]. The urgent issues are to determine the features of the impact of AR technologies and VR technologies on the future specialist's psychological features, in order to improve the capacity and construction of a new paradigm for future professionals' training, taking into account changing conditions of existence of modern society.

2 Literature Review

Analysis of the latest research and publications. J. Bylenson, O. Voiskunsky, S. Karelov, P. Kenney, N. Liberati, P. Milgram, G. Riva, V. Selivanov, L. Selivanov, M. Slaughter, E. Paulet J. Postil, R. Beringer, P. Donnelly, S. Fein-ra, S. Julier, B. McIntyre, and others were engaged in the study of virtual and augmented reality possibilities. In particular, the works of N. Guael, E. Guinters, H. Martin-Gutierrez, D. Perez-Lopez, M.T. Restivo, T. Rizova, J.-M. Sotata, O. Hugo confirmed the positive effect of the use of this technology in education and provided the opportunity to identify the use of augmented reality technology as one of the most promising means of increasing the efficiency of learning process in higher education institutions [2, 5, 13, 15, 18,

24, 27]. The works of O. Vysotskaya, K. Vyslyanskaya, N. Grinnyk, R. Kellan-Jones, O. Kostruba, V. Malynka, M. Nitki, and others are devoted to the technological tools that enable the introduction of augmented reality and virtual reality into the media environment [32]. At the same time V. Tsvetkov views virtual reality as a new form of representation and modeling of reality which gives an opportunity to gain new spatial knowledge. According to the scientist, virtual reality is a model-based multi-dimensional (3D) environment that is generated by computer means and responds realistically to the interaction with users [33]. Analyzing the latest innovative approaches and models of the use of augmented reality components in education, we should pay attention to S. Litvinova's research, aimed at the introduction of cognitive tasks using computer modeling as a determinant of increasing students' cognitive activity [11]. It is worth mentioning O. Pinchuk, V. Tkachenko, O. Burov's research, which is aimed at comparative analysis of the use of mobile applications as elements of creating cognitive tasks for students in the process of natural and mathematical disciplines learning [20]. In the framework of interdisciplinary research we have to take into account scientific analysis of the effectiveness of the use of search algorithms of learning based on cognitive visualization (L. Bilousova, L. Gryzun, N. Zhytienova, V. Pikalova) [1] and the experience of implementing an innovative approach while providing a support for pedagogical interventions in information technologies for education based on Bayesian networks (J. P. Martínez Bastida, E. Gavrilenko, A. Chukhray) [14]. Researchers (N. Balyk, O. Barna, G. Shmyger and V. Oleksiuk) have methodologically substantiated and empirically proved the effectiveness of implementing a model of teachers' professional retraining based on the development of STEM competencies [26]. In order to analyze the introduction of AR/VR technologies into the context of implementing a competency-based approach in the sphere of higher education, we have analyzed N. Morze та O. Glazunova's study on motivational component of the model of specialists' training, based on the analysis of modern standards of professional competencies of IT teachers. It consists of a series of stages: needs analysis for training; selection of training courses; completion of courses; assessment of professional competence level [8]. However, despite the deep analysis of the information given above, the mechanisms of using augmented reality in higher education, taking into account the individual characteristics of students, remain insufficiently studied, which led us to writing this article.

3 Research Methods

This research was conducted in the framework of joint research work of teachers and students (future psychologists and programmers) at the Laboratory of Psychophysiological Research and STEAM-Laboratory. The methods used in the process of research are the following: method of theoretical sources analysis; study of advanced psychological and pedagogical experience of foreign and domestic teachers on the issue of implementing a competency-based and person-oriented approach into the educational process in the sphere of higher education; development of soft-skills competencies in the process of future specialists' training; generalization and conceptualization to formulate the main points of the study; designing and modeling of empirical construct of combination of traditional and latest AR/VR technologies on the

example of diagnostics and development of future specialists' stress resistance; generalization and evaluation of results.

4 Research Results

4.1 Theoretical Foundations

According to the analysis of existing actual researches on the use of augmented reality in the process of identification and correction of personality's stress states, we have developed the concept of cooperation of two laboratories of Bohdan Khmelnitsky Melitopol State Pedagogical University - STEAM-Laboratory and Laboratory of Psycho physiological Research. Interdisciplinary research was carried out within the framework of the implementation of research work, which is performed at the expense of the General Fund of the state budget: "Adaptive system for individualization and personalization of professional training of future specialists in blended learning" – the state registration number: 0120U101970. As a result of complex analysis of data, technical possibilities and close cooperation of teachers and students (future psychologists and programmers), a model of introduction of AR technologies in the process of development of future specialists' stress-resistance in the conditions of higher education has been designed.

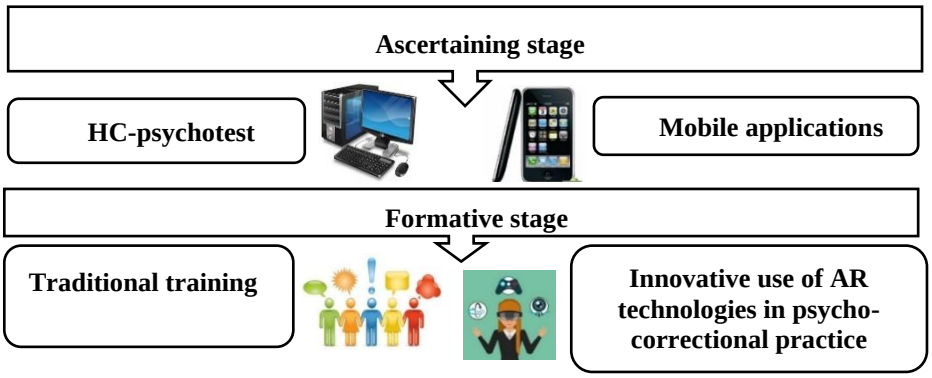

Fig. 1. Model of empirical study of future specialist's stress resistance development: experience of cooperation of STEAM-Laboratory and Laboratory of Psychophysiological Research

The pilot study consisted of ascertaining and formative stages. Total sample (randomized) - n=50 people (future programmers). According to the research objectives, the respondents were divided into control and experimental groups. No training sessions were conducted with respondents of control group. Specially organized corrective work was carried out with the respondents of the experimental group. Individual and group forms of training work were used within the limits of personality's stress resistance development. The training included elements of traditional psycho-correction work and components of AR technologies. The study was conducted during 2019 - early 2020. Students were actively involved in all stages of the study in order to enhance their scientific potential and motivation for the research. Let's consider each research stage in turn.

1. Ascertaining stage. Pilot psycho-diagnostic research was conducted at the Laboratory of Psychophysiological Research with the use of an innovative computer-based complex of HC-psychotest. To research the issues of future specialists' stress resistance diagnosis the following configurations of the HC-psychotest have been used:

a) Case "Candidate". An effective and easy-to-use tool for career guidance and selection of candidates for vacant positions, regardless of their work experience.

b) Case "Start" is used in screening psychophysiological research and gives an opportunity to monitor: features and states of personality; disorders of various mental functions; temperament and mental stability; interaction of personality and group.

At the diagnostic stage of the pilot study the following techniques have been used:

- In order to assess the formally dynamic characteristics of emotionality of people selected for the study, the questionnaire of temperament structure by V.M. Rusalov was used, in particular, the data of two scales: plasticity and emotional sensitivity.
- Qualitative characteristics of emotionality in the structure of personality have been assessed by means of Spielberger's Questionnaire in Hanin's modification (to identify situational anxiety and anxiety as a personal trait).
- Freiburg Personal Questionnaire (FPI, Form B) is designed to diagnose mental states and personal traits; it gives an idea of the effectiveness of social and professional adaptation processes, as well as of behavioral regulation.

In order to identify the level of self-analysis and self-control over stress resistance, the respondents were offered to use the following mobile applications [17]:

- Y&S personality scanners: psychological, diagnostic and psycho-emotional. The use of the appropriate application, first and foremost, is focused on self-diagnosis, which allows respondents to understand themselves better, to consider their inside problems, to self-improve in development, to make amendments in behavior and to have a confident behavior in society (https://pfscanner.com/).
- Psychology: tests - self-monitoring of mental and emotional states, identification of psychological personal traits (https://play.google.com/store/apps/details?id=com.tellstory.psychologicaltests).
- 40 psychological tests + IQ tests - diagnostics of emotional states of personality and cognitive processes, identification of interconnection (https://play.google.com/store/apps/details?id=com.muraDev.psychotests).

2. Formative stage. At the formative stage we integrated traditional psychological training on the use of cognitive-behavioral, relaxation and case-study techniques and the innovative opportunities of AR technologies. The formative stage was carried out on the basis of STEAM-Laboratory [10].

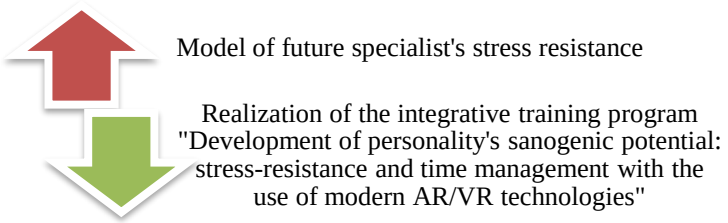

Fig. 2. Peculiarities of research formative stage realization

In this article we offer a model of future specialist's stress resistance, which shows the combination of future professional activity, individual personal traits, subject-activity level of personality, as well as personal level (see Fig. 3).

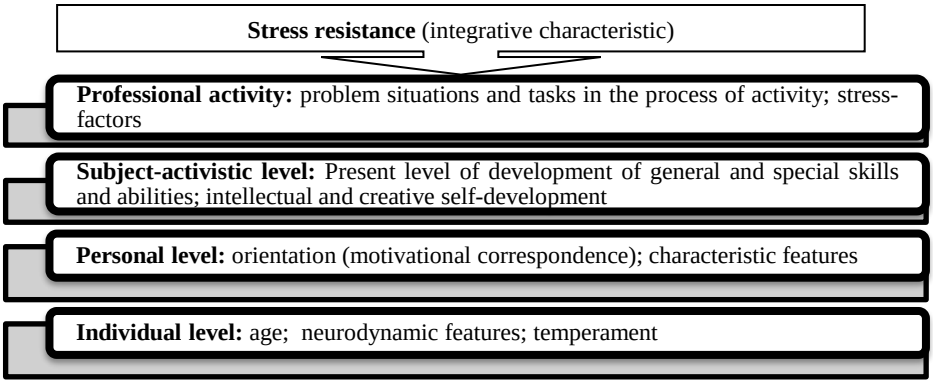

Fig. 3. Model of future specialist's stress resistance development

The structural-functional composition of the presented levels, on the one hand, is a quite stable component - according to the principle of systematicity and, on the other, it is a dynamic component, undergoing constant age and situational changes [12, 22]. The students analyzed the advantages of AR technologies in the process of their influence on the psychological features of the subject – environmental validity, control of the participant's attention in the virtual space, reducing the level of influence of side variables, possibility of selective isolation of the required stimulation, possibility of providing feedback in real-time environment, possibility to create a polymodal stimulation [34]. Traditional training, presented at the formative stage, included the psycho-corrective program "Development of personality's sanogenic potential: stress-resistance and time management" (see Fig. 4). The aim of the program is to increase the overall level of personality's stress resistance. Particular attention is paid to the formation of a positive image of a stressful situation, learning how to analyze the situation in a cognitive way, updating the skills of arbitrary relaxation and gaining the experience of applying techniques and formulas of constructive response in stressful situations [19, 23, 30, 31].

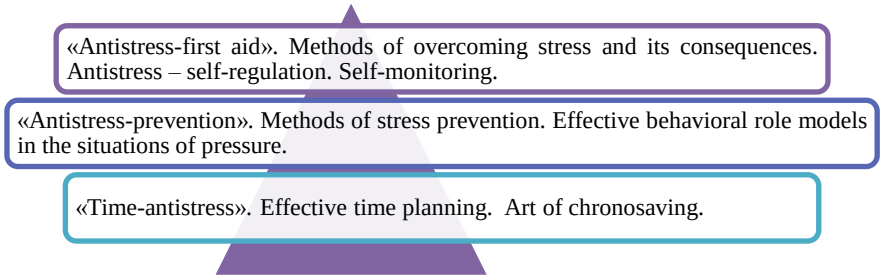

Fig. 4. Structure of the training program "Development of personality's sanogenic potential: stress-resistance and time management"

The program is created in accordance with the principles of the concept of Accelerated Learning Theory and uses all the latest developments in the field of methodology of adult learning. In order to implement the constructs of virtual and augmented reality we have used special technical equipment of STEAM-Laboratory. The minimum set of equipment, which is required to implement such an integrative approach is the following: required number of smartphones and VR helmets; tablet; computers; Wi-Fi router, Internet access; system of remote update; educational videos and software; touch pad. The XRcase system gives the opportunity to deliver classes on 10, 16 or 30 virtual reality devices. In the process of traditional training delivering, the elements of AR technologies were actively used [25, 29], namely:

1. While implementing the elements of cognitive-behavioral therapy, desensibilization techniques, aimed at reducing anxiety (fear) to scary objects or situations (such as fear of flying, heights, fear of spiders, mice, snakes), the following Google Play applications were used:

- VR Thrills: Roller Coaster 360 (Cardboard Game). An amazing roller coaster adventure in virtual reality mode. This game provides the users with the opportunity to see many different types of roller coaster in virtual reality mode. It gives the chance to feel and reflect on various mental and emotional fears, maybe even frustration.
- VR Heights Phobia. A virtual reality game with a challenge! While completing the mission, participants cope with their phobias in the VR world. They use their own body to navigate the three-dimensional world, bounce their heads up and down, and the avatar moves as well. Each movement is monitored by a telephone gyroscope, giving participants a realistic, enjoyable experience, and the participants focus on and deal with their emotions.
- VR - Phobia Horror Spider. Through this program, participants try to overcome their arachnophobia. Students explore the world of spiders at 2 different levels and their environment. This virtual, but very close to reality case, develops the skills of self-control and emotional stability in extreme stressful environments.
- VR Maze. VR Ball Maze for cardboard and daydream virtual reality glasses. Participants need to roll the ball across the maze from start to exit. The ball always moves straight. The movement of the ball is controlled by the rotation of the head. This game is aimed at the development of concentration and stability of attention, emotional intelligence, and internal analysis of psychophysical states.
- VR Mission Leviathan – underwater expedition. Virtual reality attraction VR Mission Leviathan is a 360 VR adventure. A VR helmet, goggles, or cardboard allow participants to fully experience the depth of field explorer. Mission Leviathan's VR attraction is an underwater mission simulator. Surrealistic virtual reality with carefully crafted sound and detailed 3D graphics, clear, vivid and colorful models and characters, is aimed at a comprehensive impact on all sensory features of the person, at the same time arouses a variety of emotions, feelings and experiences, shapes cognitive-reflective skills of information processing and making decisions in difficult conditions.

2. In order to implement relaxation techniques using AR technologies, the following applications have been used [6]:

- Graffiti Paint VR. In Graffiti Paint VR participants spray Graffiti in virtual reality! They just choose a can or create their own one with a certain color and start to

spray it. This application provides the possibility of psycho-emotional relief, overcoming neuro-psychic tension.

- Art Therapy. Art Therapy is an application for adults that help users concentrate on positive emotions, create their own art masterpiece, relieve emotional tension and relax [15].
- ArtOlg: Introduction. A workshop of intuitive creativity for meditation is a kind of Art Therapy. This technique is very simple, anyone, who wants to open up their inner world, realizes hidden abilities, expand consciousness, can start drawing. Intuitive painting will help users get rid of the stereotypes of thinking that prevent them from living a common life and enjoying it. The main aim of manual art therapy is to harmonize the mental state of the individual through the development of the ability to express themselves through creativity.
- Thisissand - Art, Creativity & Relaxation. Thisissand is a creative space for designing objects from colored sand; it is focused on reducing psycho-emotional stress, situational and personal anxiety, as well as on the promotion of personality's creative potential;
- Relax River VR. Participants can achieve emotional and psychological comfort while having a virtual reality boat tour, sailing on a beautiful river, with picturesque scenery of mountainous area and incredible creatures. It is a fully automatic tour, without any settings.

1. The use of augmented reality components while implementing cognitive-behavioral therapy and self-reflection:

- Moodpath - Depression & Anxiety Test. Moodpath is focused on assessing mental health, monitoring and reflecting one's own mood, as well as taking a break from negative thoughts and negative emotions. Moodpath is used as an intelligent mood tracker. Through it, participants are provided with a chance to have a quick overview of their emotional states throughout the day, master cognitive-behavioral therapy (CBT) activities, understand the cause-and-effect relationship between events and emotional states, integrate mindfulness into their daily lives, develop empathy and skills of self-observation.
- CBT Companion: (Cognitive Behavioral Therapy app). It is the most comprehensive cognitive-behavioral therapy application available today. It is equipped with easy-to-use visual tools. The application presents the scheme of formation of certain skills through cognitive-behavioral therapy. A block of video lessons is also given.
- ACT iCoach: Acceptance Commitment Therapy App. ACT iCoach is a comprehensive application that covers all aspects of acceptance and commitment therapy. Participants learn and practice ACT skills using video tutorials and fun animation that help them learn more. The application provides participants with convenient tools for tracking their mood, emotions.
- CBT Thought Diary - Mood Tracker, Journal & Record. A central element of cognitive behavioral therapy (CBT) is training to identify negative and distorted patterns of thinking in order to change one's own emotions and behavior for the better. In cognitive-behavioral therapy, "record of thought" leads participants through the stages of detection, denial and rethinking of negative models of thinking. With the Thought Diary, participants can record their negative emotions, analyze the draw-

backs in their thinking, and re-evaluate their negative thoughts into more balanced ones.

The integration of traditional AR technologies is aimed at the formation of the following soft competencies:

1. Cognitive (intellectual) competencies: knowledge of stress signs and their interpretation, stress types and stages of development, impact of stress factors on personality's psychological well-being and on life as a whole.

2. Motivational competences: development of individual stress resistance and choice of effective individual program of organization of living space and time management.

3. Communicative competences: focus on the communicative situation (ability to choose verbal and non-verbal means of communication, based on the situation content, its participants, one's own attitude), development of constructive coping strategies of behavior in a conflict situation, enhancement of self-confidence, emotional competence in communication.

4. Social competencies: personality's ability to adjust to new social conditions, ability to constructively set a goal and find ways of its achievement.

5. Technological competences: ability to organize a workplace, ability to use methods of transformation [4].

4.2 Examples of Implementation

At the stage of ascertaining research it has been found out that:

- a majority of respondents (36%) showed a predominant tendency to monotonous work, fear and avoidance of various forms of behavior, absence of flexibility, conservative forms of activity;
- a majority of research participants (38%) have a high sensitivity to the differences between conceptualized and expected issues, planned actions and results of real actions, feelings of uncertainty, anxiety, inferiority, high level anxiety about work, sensitivity to failure;
- diagnosis of anxiety level showed that a majority of respondents have a high level of situational anxiety (44%) and a medium level of personal anxiety (38%). Respondents with a high-anxiety level tend to feel the threat to their self-confidence and vitality in a wide range of situations and to respond to these situations with a high level of anxiety. Very high level of anxiety can be directly linked to the presence of neurotic conflict, emotional breakdowns, and psychosomatic illnesses. Low level of anxiety, on the contrary, characterizes the state of a person as a depressive and inactive one, with a low level of motivation;
- a majority of students have high and medium levels of neuroticism (34%). In case of high neurotic indicator, as well as in case of the sensitive type of nervous system, the peculiarity of which is the reduction of threshold of intelligibility, the sensitivity level has increased. As a result, indifferent stimuli easily cause outbreaks of irritation and agitation. Usually, those features that are characterized by an increased level of excitability are also characterized by an increased rate of exhaustion and fatigue. Respondents with low and medium "neurotic" indicators are characterized by calmness, ease, emotional maturity, objectivity of self-evaluation and evaluation of other people, stability in plans and preferences. They do not reject their own short-

comings and blunders, they do not worry about small things, they feel well-adapted and show conformity;

- a majority of participants have a low level of emotional lability (40%). Low indicators are found out with emotionally mature individuals, who are not inclined to fantasies and think realistically. In their behavior, they are guided by reliable, truly tangible values.

Thus, the findings of the ascertaining research stage showed that a majority of the participants have low level of emotional stability and sanogenic potential in general. Respondents showed a high level of anxiety, restlessness combined with rapid exhaustion, low level of stress resistance, high anxiety about work, and sensitivity to failure. In order to finalize the results of integrative psycho-corrective work using the elements of traditional training in combination with modern AR technologies in the experimental group, a re-diagnosis was conducted so that to identify the dynamics of development of personality's stress resistance. To check the statistical validity of the data obtained before and after the correction, we used Wilcoxon's T-criterion.

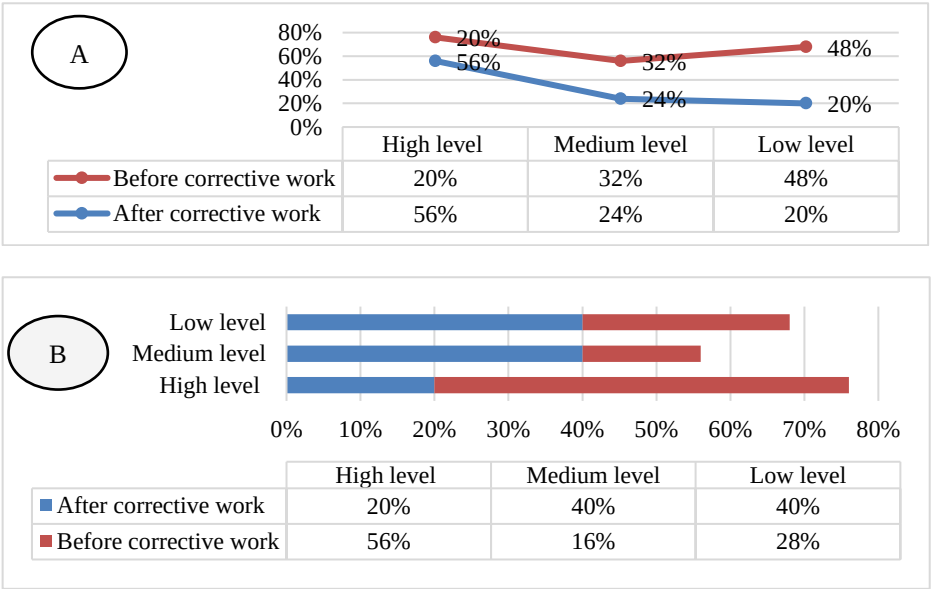

Fig. 5. Comparison of the results of the diagnosis of temperament structure according to V.M. Rusalov's indicators: a) "plasticity" b) "emotionality"

As a result of the comparison of empirical data after carrying out the corrective work on the basis of implementation of stress management program using the Wilcoxon T-criterion, it has been revealed that in the experimental group there is two times increase in the number of respondents according to the "plasticity" indicator (56%), there are no significant changes in the control group. Thus, we can conclude that after conducting psycho-corrective sessions, the indicators on the scale of "plasticity" have positively changed (compare $T_{emp.}$ ($T_{emp.}$ = 101.5) with $T_{crt.}$, which at the significance level p = 0.05 and n = 50 is 466. We accept hypothesis H_1: the signifi-

cance of the shifts in the typical direction exceeds the significance of the shifts in the non-standard direction). This indicates that the level of flexibility of thinking and behavior, ability to switch from one activity to another has increased. The indicators on the scale of "emotionality" have decreased, that is, there is an increase in the role of control over emotional manifestations while responding to different events related to practical activity and communication with people, the role of the cognitive component in the perception of stress factor (compare $T_{emp.}$ ($T_{emp.}$ = 101.5) with $T_{crt.}$, which at the significance level p = 0.05 and n = 50 is 466. We accept hypothesis H_1: the significance of the shifts in the typical direction exceeds the significance of the shifts in the non-standard direction). This indicates that the level of insecurity, anxiety, inferiority, anxiety about work, sensitivity to failure has decreased.

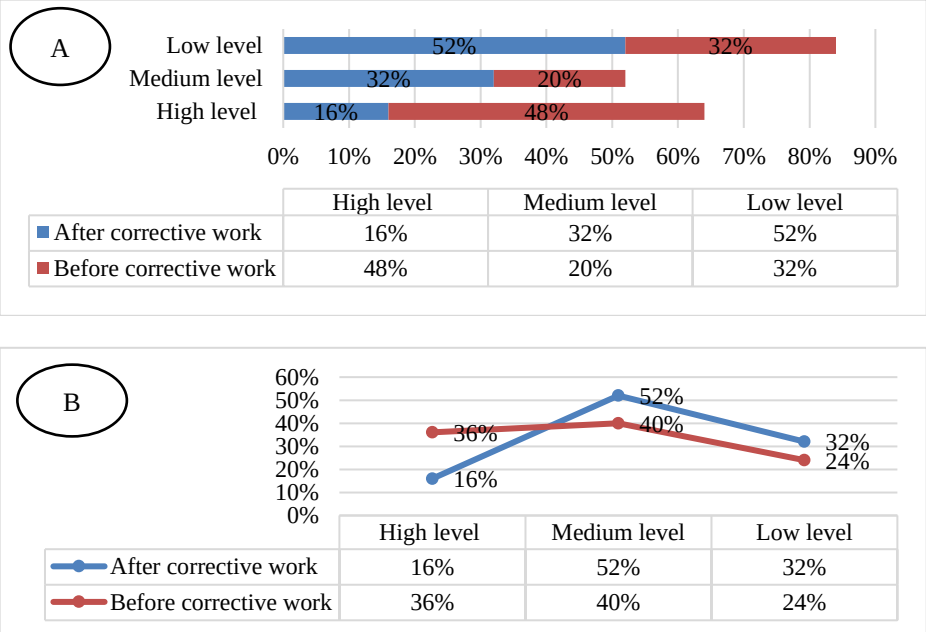

Fig. 6. Comparison of diagnostic results of a) situational and b) personal anxiety according to Spielberger-Hanin scale

After corrective work, the level of situational anxiety in the experimental group has decreased by 1.8 times (52% is the dominant low level). Compare $T_{emp.}$ ($T_{emp.}$ = 143) with $T_{crt.}$, which at a significance level p = 0.05 and n = 50 is 466. We accept hypothesis H_1: the significance of the shifts in the typical direction exceeds the significance of the shifts in the non-standard direction. This indicates that the level of situational anxiety has decreased. A decrease in the level of personal anxiety in the experimental group has been also found out and statistically proved, the dominant moderate level is 52%. Compare $T_{emp.}$ ($T_{emp.}$ = 120.5) with $T_{crt.}$, which at a significance level p = 0.05 and n = 50 is 466. We accept hypothesis H_1: the significance of the shifts in the typical direction exceeds the significance of the shifts in the non-standard direction.

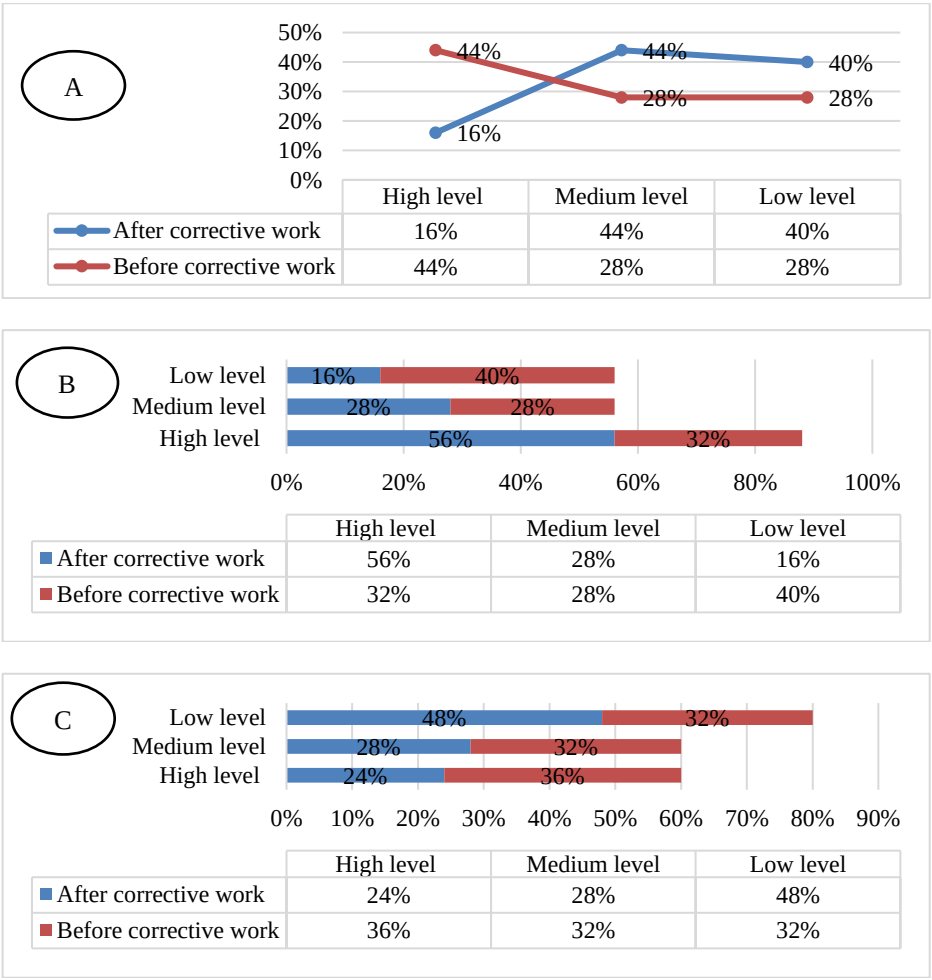

Fig. 7. Comparison of the diagnosis results of neuroticism level (A), equability of mind (B), emotional lability (C) by means of using a Freiburg Personal Questionnaire

As a result of the comparison of empirical data before and after corrective work it has been revealed that there exists a significant decrease in the level of neuroticism of the respondents (dominant average level - 44% and low level - 40%). Compare $T_{emp.}$ ($T_{emp.}$ = 111) with $T_{crt.}$, which at a significance level p = 0.05 and n = 50 is 466. We accept hypothesis H_1: the significance of the shifts in the typical direction exceeds the significance of the shifts in the non-standard direction. Thus, we can conclude that after conducting psycho-corrective sessions, indicators of "neuroticism" scale have positively changed. This proves the fact that the level of anxiety and agitation combined with rapid exhaustion has decreased. Scale VI (equability of mind) displays stress resistance. Most respondents have a positive dynamics in the development of equability of mind. A high level (56%) was found out to be dominant in the experimental group after the corrective work. Compare $T_{emp.}$ ($T_{emp.}$ = 140) with $T_{crt.}$, which

at the significance level p = 0.05 and n = 50 is 466. We accept hypothesis H_1: the significance of the shifts in the typical direction exceeds the significance of the shifts in the non-standard direction. After conducting psycho-corrective sessions, the indicators of the equability of mind scale have positively changed. It shows the increase of the level of freedom from conflicts, satisfaction with oneself and one's own successes, readiness to stick to the norms and meet the requirements. As a result of the implementation of training based on the use of AR technologies, the level of "emotional lability" of the experimental group respondents has decreased (dominant low level - 48%). Compare $T_{emp.}$ ($T_{emp.}$ = 182) with T_{crt}, which at a significance level p = 0.05 and n = 50 is 466. We accept hypothesis H_1: the significance of the shifts in the typical direction exceeds the significance of the shifts in the non-standard direction. Thus, we can conclude that after conducting psycho-corrective sessions, the indicators on the scale of "emotional lability" have positively changed. This shows that the level of "emotional lability" has decreased. Analyzing the results, we can say that a psycho-corrective program with elements of AR technologies has contributed to the increase of emotional stability and stress resistance of the individual. It has been found out that future specialists' level of situational and personal anxiety, insecurity, inferiority, anxiety about work, sensitivity to failures has decreased. As for the level of flexibility of thinking and behavior, ability to switch from one type of activity to another, it has increased. So, a general level of personality's adaptive abilities has also increased.

5 Conclusions and Recommendations for Future Research

The key features of the system of future specialist's professional training are the results of globalization and technologization, which can be observed at the present stage of society development. Under the conditions of globalization, a network model of knowledge dissemination is being formed. It is characterized by the rapid dissemination of a new information product through the Internet [7]. In the context of the society technological development, new approaches and formats for the presentation and transfer of knowledge in the professional field are being formed. They provide available, high quality and personalized access; new conditions of professional activity realization due to the development of modern technologies (artificial intelligence, robotics, 3D modeling and prototyping, virtual reality, etc.). Analyzing the works of foreign authors on this topic (Kaiser R., Schatsky D., etc.), it should be noted that the increasing popularity of the augmented reality technology and interest to it, at the present moment, is driven by the research works that provide the rational for the prospects of using augmented reality technology through the expansion of production sphere and creation of completely new spheres and service markets in the near future [3, 9]. Due to such a global introduction of augmented reality elements into education, our research, aimed at the implementation of an integrative approach in the development of future specialist's stress-resistance, has turned out to be a very vital and important one. This research shows an innovative combination of traditional psycho-diagnostic and corrective influences with modern AR/VR technologies. This research was conducted within the framework of the cooperation of two laboratories – Laboratory of Psycho physiological Research and STEAM-Laboratory. At the methodological level of the research we have analyzed and substantiated the ways of combining traditional methods with AR/VR technologies, and the model of personality's stress

resistance has been designed. At the empirical level, the effectiveness of implementing AR/VR technologies into the process of stress resistance development, as an integrative feature of future specialist, that directly influences productivity and efficiency of the future activity, has been proved. The perspectives for further research are the following: development of the concept of the purposeful use of AR/VR technologies while constructing an effective personality-oriented vector of higher education; research of the impact of augmented reality elements on a person's mental characteristics.

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