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Shift from blended learning to distance one during the lockdown period using Moodle: test control of students' academic achievement and analysis of its results

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Abstract. The article highlights the urgency of the problem of introducing blended learning into the educational process of institutions of higher education and ensuring the quality of education using the tools of e-learning management system. The experience of using electronic testing during the final control of students' educational achievements is covered. A thorough analysis of the results was carried out, in particular the relationship between current and final grades, test scores and its duration were established. The reliability of the test tasks separately and the test as a whole, among other indicators, were tested using mathematical statistics methods.

1. Problem statement

In the context of global computerization of education, the problem of searching the ways of optimal combination of traditional learning (face-to-face learning) and distance learning using ICT is still relevant. One of the modern educational trends is blended learning. According to a number of scientists, such as Nisha Shantakumari [28], Li Mei [20] and others this kind of learning makes it possible to eliminate the shortcomings present in traditional and distance learning, if considered separately.

Due to the fact that education was affected by the COVID-19 pandemic and as a response to the quarantine implementation with university closures and restrictions in a considerable number of countries worldwide in winter and spring of 2020 a shift to distance-learning has become a crucial matter in education [3], [6], [9], [36], [37]. In particular, it has become essential to enhance a teacher-student interaction and to provide guidance and support in the modes of synchronous and asynchronous learning.

The use of Moodle learning management system in the learning process during the lockdown on the conditions of providing appropriate methodological guidance and requirement of the development of a certain level of computer literacy; specifically, students' knowledge and abilities to use computers and related technology ensures a high quality of education.

2. Theoretical background

2.1. The theoretical background of blended learning use

Yurii V. Tryus and Inna V. Herasymenko contemplate the blended learning as synthesis of traditional, electronic, distance and mobile learning. Scientists give a rather complete definition of this notion:



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“Blended learning is a purposeful process of acquiring knowledge, competences and skills, digestion of ways of cognitive activity by the subject of learning; and development of his creative abilities on the basis of complex and systematic use of traditional and innovative pedagogical technologies and information and communication technologies of learning on the principle of complementarity for the purpose of improving the quality of education” [38]. This definition doesn’t contradict the interpretation by Andrii M. Striuk. He defines blended learning as a purposeful process of acquiring knowledge, competences and skills in the context of classroom and extracurricular training of the subject of learning process on the basis of mutual complementation of traditional, electronic, distance and mobile learning [30].

One of the positive features of Moodle is the ability to use it with the appropriate mobile application. So, learning really becomes mobile and dynamic [17], [23], [34], [35]. Mykola I. Striuk, Serhiy O. Semerikov and Andrii M. Striuk define the mobile learning (M-Learning) as a modern direction of development of distance education systems with the use of mobile phones, smartphones, e-books [31]. Researchers identify a number of advantages over other learning systems, including interactivity, instant feedback, time-limitation, and more. Thus, the students were able to pre-process study materials, tests at a convenient time and in a convenient place for them. Phones, which are constant companions of modern young people, in the described situation, turn into a powerful working tool.

Comparing the academic performance of students in blended and traditional learning, researchers conclude that blended learning contributes to enhancing students' academic achievements and improving the quality of education as a whole [4], [10], [13], [14], [25], [27].

Ajlan Al-Ajlan and Hussein Zedan are convinced that Moodle is the optimal VLE platform in terms of tool capabilities of a system and technical aspects [2]. Mugenyi Justice Kintu, Chang Zhu and Edmond Kagambe state that the characteristics of Moodle are good organization of online resources, their convenience and accessibility, structuring; efficiency of communication tools use [14]. Gabriela Carmen Oproiu marks the possibility of synchronous and asynchronous access, group work or personal communication organization [25].

As mentioned above, one of important factors of successful blended learning organization is ICT literacy of a teacher and a student [14], [26], [32]. Technology is just a tool, and its effective use totally depends on readiness of a teacher and a student for it [20].

According to D. Randy Garrison and Heather Kanuka, blended learning is a consequence of reconceptualizing and reorganizing of the learning process, changing its dynamics [8]. Thus, the closed teacher-oriented model of learning is replaced by more open, student-oriented one where a teacher becomes a mentor [18], [21].

Therefore, learning using the Moodle system has the undeniable benefits demonstrated by numerous studies of scientists. However, the specifics of preparing the materials for the final assessment and its implementation in the context of improving the quality of education are not sufficiently clarified yet.

2.2. The theoretical background of the application of testing technologies in education

Aleksei N. Maiorov defines the test as a tool consisting of a qualitatively validated system of test tasks, a standardized procedure of conducting and pre-designed technology of processing and analysis of results, designed to measure the qualities and properties of a personality, change of which is possible in the process of systematic learning [19].

Usually, the test is a standardized method of determining students' level of preparedness. All test participants are assigned the same tasks, under the same conditions and with the same rules of evaluating the answers. Due to this method, you can determine the order of the participants according to their level of knowledge and, respectively, to determine the place in the group objectively or rating of each student.

Analysis of the [1], [11], [12], [22], [24], [29], [33] allows to distinguish a number of **advantages of testing**, in particular electronic testing, in comparison with other forms of control of educational

achievements of students: objectivity of assessment, which excludes subjective evaluation judgments and conclusions of a teacher; minimizing the emotional impact of a teacher on a student, increasing the level of psychological comfort; the ability to submit test tasks using the text, audio and graphic information, multimedia effects, etc.; ensuring the same requirements for users' knowledge and skills due to the use of tasks of the same complexity, scope and content in the test; simplicity and unambiguity of the answer input procedure, independence of assessment from the writing technique; rapid testing, enabling large numbers of students to be reached at minimal time; automation of verification; possibility of its use at all stages of learning; the possibility of realizing not only the controlling but also the educational function. It promotes the development of students' independence and activity, increases the intrinsic motivation for learning.

However, the analysis of the test form of control will be incomplete without indicating its shortcomings: considerable time and effort consuming to create a bank of test tasks; high qualification requirements for developers of test tasks; remembering the correct answer by a student; limited ability to test the logic of the student's thinking, ability to formulate their own opinion, etc.

The disadvantages of testing include the possibility of guessing the correct answer.

In general, the testing process is divided into several stages: designing and creating a test bank; testing; processing and analysis of test results.

The authors of [5], [7] and [19] have developed clear recommendations for the test tasks development. Thus, the content of the test tasks must correspond the program requirements and the content of the training. The tasks formulation should be clear and contain one unfinished thought. The answer options are mutually exclusive, maximum homogeneous, similar in size, unambiguous and plausible. The answer options are mutually exclusive, maximum homogeneous, similar in size, unambiguous and plausible. It is desirable to avoid the answers "all of the above", "I do not know", "none of the above"; use the words "sometimes", "often", "always", "never", "all" carefully; avoid double objections or highlight them in another font. All parts of the task should be grammatically consistent. It is advisable to arrange the answers in a logical sequence – from smaller to larger (or vice versa), alphabetically and so on. Optimal number of alternatives for one task is 3-5 items.

The situations when the answer choices contain prompts or no correct answer at all are wrong; or formulating of one test question is a clue to another; or the content of the task contains contradictory statements.

It is a difficult to determine the time limits of testing. It is usually empirically resolved.

3. Problem

The purpose of this article is to present the experience of conducting final control of students' academic achievements through the means of electronic testing Moodle, to analyze the received results and to formulate recommendations for further improvement of the specified procedure.

The following research methods were used in the course of the study:

- theoretical methods – studying and analyzing scientific and methodological literature made it possible to distinguish blended learning as one of the priority areas of higher education development and to justify the expediency of using the Moodle system in the educational process; to realize the advantages and the disadvantages of the test control of students' educational achievements; to formulate recommendations concerning further improvement of the electronic testing procedure in the Moodle system;
- empirical methods – the final control of students' achievements has been carried out with help of electronic testing. The survey made it possible to determine the attitude of teachers and students to the electronic testing procedure;
- methods of mathematical statistics, which made it possible to interpret quantitative and qualitative empirical data, establish the significance and reliability of the received results.

4. Shift from blending learning to distance one during the lockdown period

4.1. Distance learning of future teachers during the quarantine period

A large variety of tools leads to significant differences in the ways of presenting academic transcripts, organization of assessment, which causes a certain fragmentation of perception. This, in its turn, can be a factor in slowing down the pace of learning and reducing the cognitive activity level. One of the ways to solve this problem is to unify the user interface and data sharing ways within a single integrated blended learning support environment. Moodle can be the example of such environment.

The advantages of using Moodle during the quarantine period are the following: the adaptability of the system, easy maintenance and low software requirements, the ability to integrate the electronic system for the needs of student learning. Among the positive features of this VLE there are interactivity, a wide range of tools, support for various multimedia formats, the availability of exchange of ideas (forum, chat, posts, etc.).

At the same time communication in the Moodle system is not widespread, apparently due to the prevalence of social networks and mobile applications. That is why Zoom and Skype software, instant messaging technology Viber and Messenger have been widely used as communication tools, services and tools offered by Google have been used for file-sharing purposes and document collaboration as well as the features of Whiteboard in Zoom. For asynchronous group collaboration the students used the Moodle forum module, while in the mode of synchronous learning the feature of Zoom breakout rooms has been used.

At Kryvyi Rih State Pedagogical University, the development and use of modern ICTs is one of the priority areas of activity. There is a process of the university electronic educational environment formation. Its structure includes an institutional repository, cloud repositories (Google Drive) of information-educational resources of departments, Google Classroom, Moodle and more. All first-year students are registered in Moodle before the start of each academic year. Moodle logins and passwords are obtained by students during an organized meeting with system administrators, including the authors of this publication.

Moodle e-learning courses can be used as means of studying for full-time and part-time students at all stages of student learning process during the studying relevant disciplines, as a methodical and didactic aid of classroom training, during independent work, practical training of students, for realizing control activities [15], [39].

The authors have developed a number of e-learning courses that are successfully used in learning by students, including mathematics and its teaching methods, foreign languages, etc. aimed at third year and fourth year students of German-English department respectively.

During the quarantine period the use of Zoom's features was effectively implemented within distance learning at Kryvyi Rih State Pedagogical University to intensify the students' progress in their English language proficiency. To be more precise, at the beginning of the class the Zoom's Polling feature was used as a tool for warming up activities. This very feature enabling to create multiple-choice questions was adjusted to boost students' receptivity during the class later. Via this feature teachers are free to create either general or specific topic-related questions. The choice of questions is justified by the class objectives. On collecting the students' responses the teacher had a possibility to arrange a short discussion afterwards (see figure 1).

Zoom breakout rooms were used to divide students into groups. Each of these groups received a task to voice over a video fragment which corresponded to the topic under discussion. For instance, if the topic in question was "Travelling", it could have been a video about various tourist destinations and the students performed the roles of narrators providing information on these tourist attractions. Speaking in terms of Zoom chat use during the process of English learning the students were encouraged to participate in story-telling. It favoured the improvements of their writing skills. They were suggested using different parts of a story to create their own one collaborating together via the chat feature in Zoom. As for the Whiteboard in Zoom rooms it was used to conduct Pictionary games in order to revise lexical material e.g.: idioms, phrasal verbs etc.

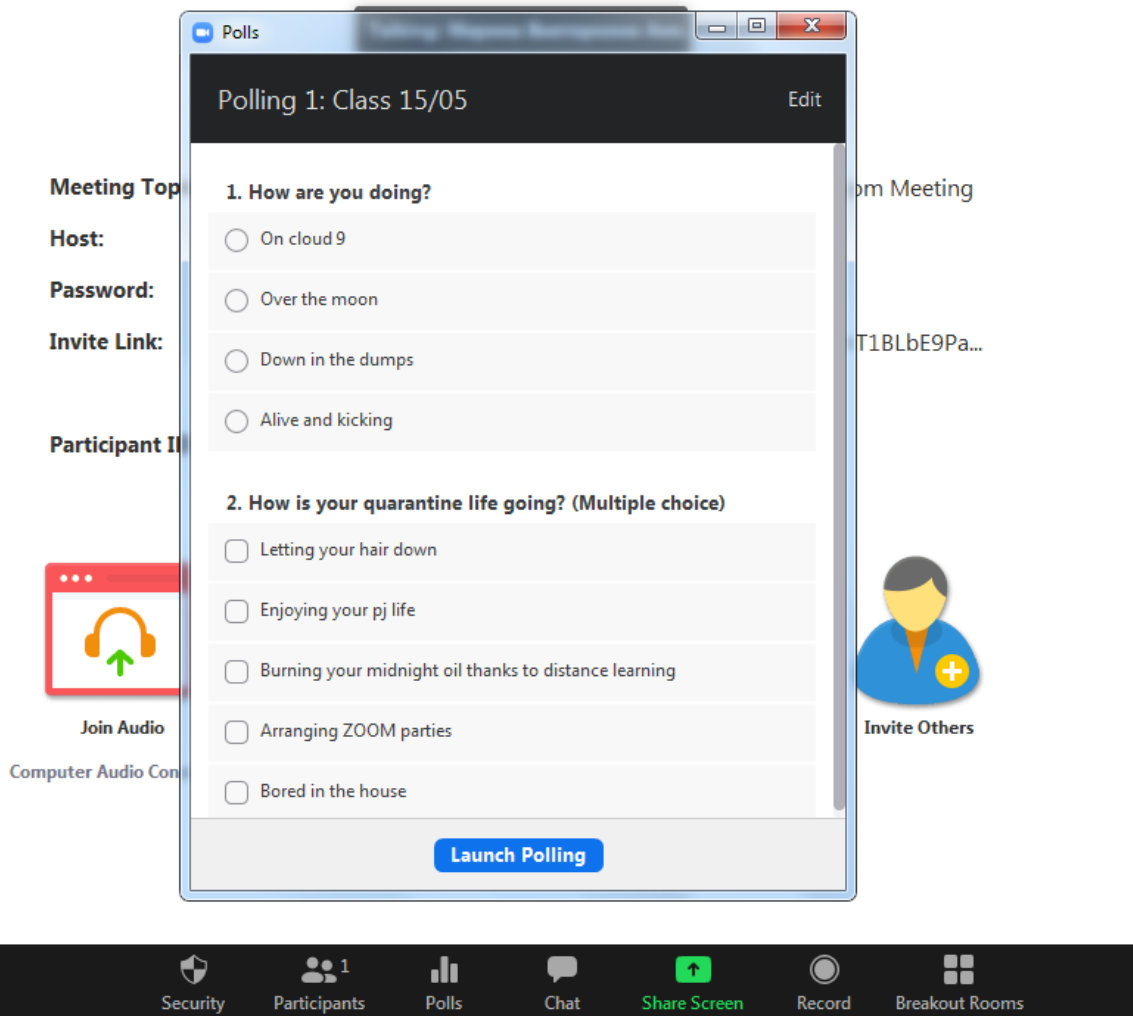


Figure 1. Example of Zoom Polling.

Through screen-sharing feature of Zoom Kahoot! was used in the English learning process (see figure 2). The platform in question offers a lot of options for creating quizzes to meet various educational demands. The advantage of this learning platform is that it provides a possibility to engage students into the team playing. The quizzes were aimed at the vocabulary revision.

Except for the use of Moodle as a platform for creating different tests the teachers used Google forms as an additional app to serve the same purpose. The tests were created to monitor the students’ progress after the new grammar material introduction. Consider the following example (see figure 3).

Participants of the distance learning process, compared with the traditional one, show less stress and more effective learning, increasing of interest in the subject, facilitating the perception of educational material.

4.2. The structure of the suggested tests for the final foreign language assessment

During the advanced training of mathematics teachers, as well as during the summer examination session of the 2018-2019 academic year, the final examinations in the selected academic disciplines at Kryvyi Rih State Pedagogical University were conducted in the form of electronic testing. For example, more than 300 students for whom this discipline is not profession-oriented, have participated in English language testing, including future teachers of computer science, physics, mathematics, geography, biology, chemistry, history, and more. As it is known, the test does not allow to test and

evaluate perfect, productive and creative knowledge of students. But the purpose of studying the mentioned discipline is to form a basic level of correspondent competence, that is why the chosen form of control is appropriate.

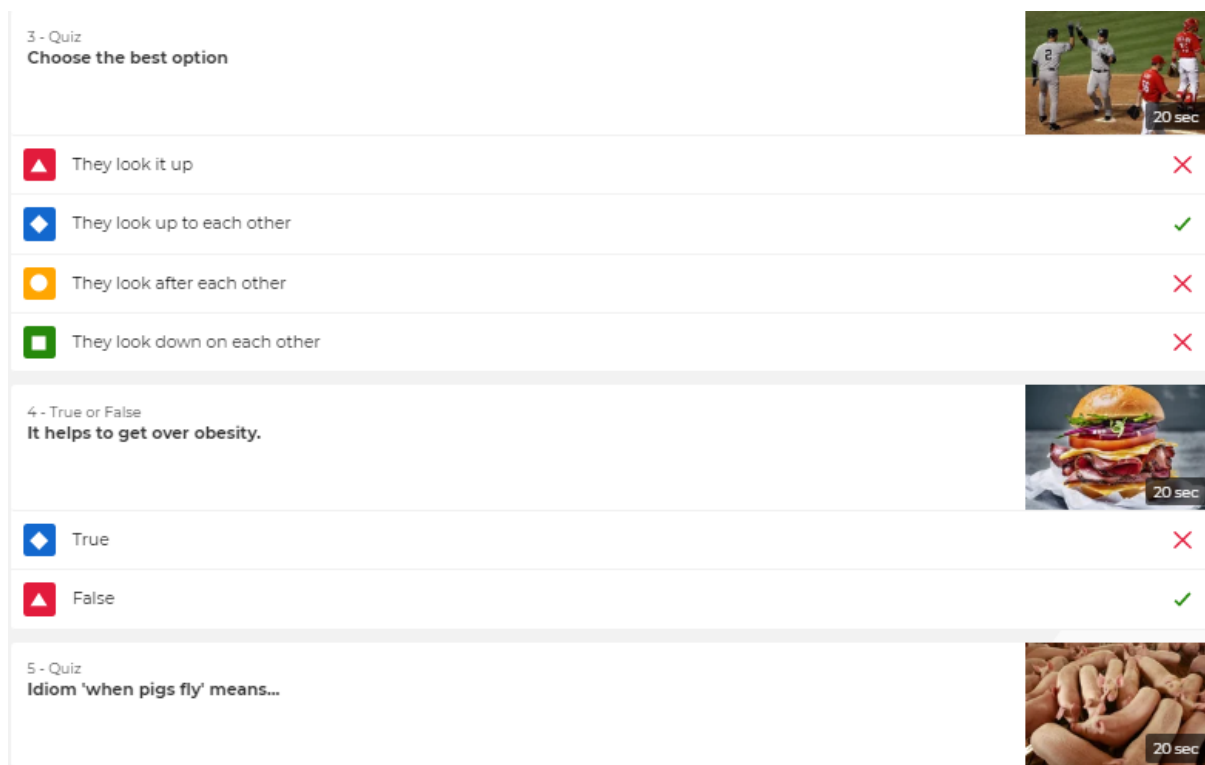


Figure 2. Kahoot! Quiz example.

The electronic testing was preceded by considerable preparatory work. The testing program covered 12 topics, including Family, Holidays, Our University, Ukraine, Kyiv, Kryvyi Rih, London, The UK and more. Exam topics were presented to the students. Their various aspects were learnt during the classroom lessons. Thus, 12 structurally unified tests were created by teachers of the Department of the English Language and Methods of Teaching and Department of English Philology in Kryvyi Rih State Pedagogical University. Each test consisted of four blocks.

The first block stipulated a selection of the title (from the suggested variants) to the paragraph of the text and contained the following instruction: “There are two choices you don't need to use”. There were 5 paragraphs in the text, with 7 answers respectively. Thus, the choice of each title had to be conscious and considered, each title provided an element of choice. Consider one of the suggested paragraphs Kew Gardens:

As well as being the most visited gardens in Britain, the Royal Botanic Gardens at Kew are also a world renowned botanical research centre and a place of training for professional gardeners. The massive 300-acre site has three huge glasshouses containing an astonishingly rich variety of plants. Many of the buildings at Kew are as interesting as the plants. There is a large Chinese pagoda built in 1762 and a model of a Japanese temple. Also of interest are the Palm House, a beautiful Victorian iron and glass building, and the Temperate House, which is the largest Victorian glass structure in the world. And let's not forget Kew's library which has one of the largest botanical collections in the world including books, drawings and photographs. The suggested choices: A a realistic garden that is very realistic; B well-known for its impressive architecture; C use alternative energy sources; D developed over a very long period of time; E garden with many illustrations of plants; F a garden its owners; G partly famous for the scientific studies (Answer: G).

Test

Email address *

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He is considered _____ a good president. Everybody likes him. *

to have been

to be

that he is

The company is said _____ more than 100 million dollars only last month. *

to lose

that it has lost

to have lost

Figure 3. Grammar test via Google Forms.

The second block stipulated filling the gaps in the text. There were 4 answer options for each gap. There were 8 such gaps in the text. For instance: The Best of Britain.

It's time for the "PlanetSong Music Competition" again. Several British hopefuls are working hard ahead of the finals in Brussels in the hope of (1) ... the contest for their country. Like the other contestants, Marcus Inman is excited to have an (2) ... to represent his nation. He says that it's every boy's dream to perform for his country at the (3) ... level. Marcus adds that he believes the contest is the most important music event of the year and that he feels he has a (4) ... to do his very best for the UK. Marcus isn't a newcomer to the music business, though. He was (5) ... the lead singer of the noted heavy rock band, "The Fortress". His band's first album sold hundreds of thousands of copies and as a (6) ... their first single, "Missing a Piece of the Puzzle": (7) ... number one in the music charts. After his huge achievement, Marcus (8) ... his mind to take a short break. From recording songs. However, he assures everyone that his new "PlanetSong" ballad means he's well and truly back!

- | | | | |
|-----------------|---------------|-------------|--------------|
| 1 A gaining | B earning | C winning | D beating |
| 2 A appointment | B opportunity | C option | D occasion |
| 3 A highest | B steepest | C tallest | D biggest |
| 4 A service | B duty | C job | D task |
| 5 A lately | B recently | C currently | D previously |
| 6 A reason | B cause | C reaction | D result |
| 7 A took | B reached | C arrived | D grabbed |
| 8 A made up | B put down | C set out | D got on |

To complete the tasks of **the third block**, students had to read the text firstly and then to determine if the statements after the text are true or false. There were 8 suggested statements. Consider the text Crazy Mom’s Fashion with the related statements:

It started 20 years ago. One day, Jane Smith, a busy mom and a loving wife, went shopping for new clothes. After a few hours of searching, she came home exhausted and disappointed. In the mid-80s, few manufacturers made clothes for women over thirty. “Thousands of women in England have the same problem, and I will help them,” – thought Mrs. Smith. With very little money, no connections in the fashion world and a husband who thought that her idea was crazy, the ambitious woman decided to start up her own business.

Jane designed her first collection of twenty clothing items, bought suitable material and sewing machines, and hired experienced tailors. The Smiths’ balcony turned into a workshop. When the collection was ready, Jane offered it to a famous chain of stores. To her surprise, they bought the whole collection at once. When they asked her about the name of her company, Jane looked at her husband, smiled and said: “Crazy Mom”. The collection was sold in a very short time – women liked Jane’s models. In a month, the manager of the chain ordered more clothes from “Crazy Mom” and Jane had to hire more people and find a bigger place for the workshop. The next step was opening her own shop at the central train station in Manchester.

Now “Crazy Mom” has 50 boutiques all over the world. Mr. Smith left his job as an engineer and became head of the company. Their four children also work in the company and, according to Jane, this is what makes the business so successful.

- | | | |
|----|--|-------|
| 1. | Jane Smith came home after her shopping tired and sad. | T / F |
| 2. | It was not a problem for women over thirty to buy clothes. | T / F |
| 3. | She decided to set her own business with a few strings to pull. | T / F |
| 4. | Her husband did not quite believe her business to be a success. | T / F |
| 5. | The idea of calling her company “Crazy Mom” was suggested by her child. | T / F |
| 6. | The shop was opened at the railway station in Manchester. | T / F |
| 7. | Mrs. Smith is the head of the company. | T / F |
| 8. | According to Jane her business is successful because it is a family-run one. | T / F |

The fourth block anticipated the combination of the definition with its formulation, the notion with its characteristics, etc. (8 statements). For instance, there are notions connected with the topic Family and the definitions related to the notions in question:

- 1) *Mother-in-law*
- 2) *Sibling*
- 3) *Half-brother*
- 4) *Cousin*
- 5) *Father-in-law*
- 6) *Step-father*
- 7) *Sister-in-law*
- 8) *Great grandfather*
- A) *Father of someone’s grandparent*
- B) *Mother of your husband or wife*
- C) *Father of your husband or wife*
- D) *A non-biological male parent married to one's preexisting parent*
- E) *A brother who is the son of only one of your parents*
- F) *A person who shares a common ancestor that is at least 2 generations away*
- G) *The wife of your brother or sister, or the sister of your husband or wife*

So, the bank of test tasks totaled 348 ones. The control test had a similar structure (4 blocks), with each block being randomly selected by a computer. Thus, students usually had questions on different topics in the test. In this case, each student of the group had a different set of tasks that made it impossible to cheat. In fact, a student had to complete 29 tasks during the test. The time limit was 45 minutes to complete the tasks.

As the test was open to all enrolled users during the testing, to prevent unauthorized entry into the test of other students at the beginning of the exam, a password was set in each group, which changed upon completion of the exam.

Before the session beginning, a schedule was set. According to it the teachers were present at the exams of those groups of students in which they did not teach. Thus, the teachers were not interested in the results of “not their” students. It additionally ensured the objectivity of testing and the conditions of its conducting.

The maximum score students could receive for the test was 60, for the work during the course of study – 40. The total grade was calculated by adding the first and second scores. So, testing was more important than current work. Such distribution of scores was dictated by the goal of creating identical conditions for students taught by different teachers using different methods, but according to one program.

4.3. Prerequisites for the final assessment

Students were acquainted with the testing procedure in advance and were informed of the results of their current work. Sometime before the test control, students were given access to a bank of exam assignments. Each student had two training attempts, i.e. each of the twelve suggested topics could be completed twice. At the end of both the training and control tests, students saw only the final score for the block and the overall result, without correct answers. The student was able to find out which topic or which component of the test needed more attention, but did not receive ready answer. It prevented mechanical memorization of the correct variant, and led to the analysis of mistakes.

The organization of training testing in the Moodle system enabled the teachers to monitor the process of preparing students for the exam, in particular the intensity of carrying out the tasks, the number of students involved in the work, etc.; to identify common mistakes and to work with them with students.

The testing results in the process of blending learning (the 2018/2019 academic year) have been pre-processed, the detailed suggestions regarding running the final assessment test during the quarantine have been taken into consideration.

5. The analysis of the final assessment test results

Let us to analyze the results of students testing. Let’s consider the table 1, which lists the students, the time of the test, the score for the test and for the current work, the total score.

Table 1. The results of students testing.

	Student	Test execution time	Test score	Current work score	Total score
1	Student1	26 min 43 sec	41	20	61
2	Student2	35 min 57 sec	48	40	88
...
324	Student324	30 min 46 sec	23	5	28
	Average	21.3 min	41	26	67

The results of testing for statistical analysis should be offered to students in the learning process. For example, when studying such disciplines as “Methods of mathematical statistics in scientific research” (specialty 014 Secondary education (Mathematics)), “Probability theory and mathematical statistics” (specialty 014 Secondary education (Informatics)), “Methods of mathematical statistics in sociology” (specialty 054 Sociology), “Probability theory and mathematical methods in psychology” (specialty 053 Psychology).

Specialized software for statistical calculations can be used to work out the results of the study. We used the easy-to-use Microsoft Excel tool (building histograms and graphs of correlation dependencies, analysis package to obtain descriptive statistics, comparison of averages and variances); GRAN1 (<http://www.ktoi.npu.edu.ua/index.php/uk/zavantazhyty/category/1-gran1>) to test the hypothesis of a normal distribution law for the test scores obtained and the current, test task completion times [40]; Google Sheets, GeoGebra. A number of numerical characteristics of the test can be obtained from the results of statistical analysis by means of Moodle (https://docs.moodle.org/dev/Quiz_statistics_calculations).

The main directions were defined for data processing:

- descriptive statistics for final and current control scores and assignment time;
- statistical evaluation of averages and variances for final and current control scores;
- search for correlation between test results and current control; between test results for different task blocks;
- statistical verification of statistical hypotheses regarding equality of variances, averages, significance of sample correlation coefficients, etc.

The average value of the test results is 41 scores (out of the maximum possible 60), which is 68%. The average score for the current job is 26 scores (out of a maximum of 40), which is 65%. The indicators are quite high. In order to compare the percentages averaged, it is first appropriate to test the hypotheses of a normal distribution law for the percentages of the samples and to compare the variances. Normal distribution hypotheses were tested by Pearson's criterion using GRAN1 [40]. In this case, it is advisable to take advantage of the proposed in the tool splitting the data range into 9 equal intervals (see figure 4). As well as expedient skewness and kurtosis test using built-in Microsoft Excel features ($t_s=1.71<3$; $t_k=0.17<3$).

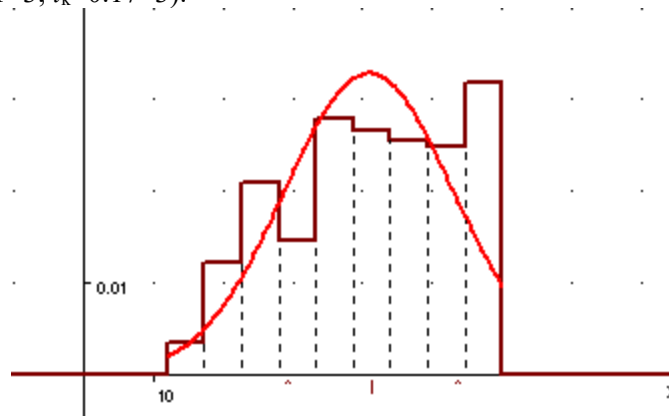


Figure 4. Histogram of distribution of relative frequencies of scores of final testing.

Next, it is advisable to compare the two variances. The results of the comparison of the variances show that they are different ($S_1^2 = 408.6$; $S_2^2 = 566.0$; $F = 566.0/408.6 = 1.38 > F(0.05; 322; 322) = 1.20$; statistical functions of Google Sheets FINV and F.INV.RT). There is less scattering of data around the average for the final test results. Therefore, for comparison of averages, they used a t -test with different variances (Tests of the Difference Between Population Means: Population Variances Unknown and Not Equal). It was found that the average scores for the testing and current scores would not be significantly different ($t = 1.82 < t(0.05; 628) = 1.96$; statistical function TINV).

In order to investigate progressive shifts in the study of a subject through the use of Moodle tools, it is advisable to compare the shifts in the scores of the first two diagnostic trials and the control trial. Statistical groups can be analyzed for three attempts on nonparametric Friedman and Page criteria, and for two attempts on the G-criterion and Wilcoxon test. However, these algorithms provide for the use of samples of small volumes. For example, you can test the hypotheses for individual academic

groups. If we monitor the trend of increasing values of the trait (points scored) in the transition from training exercises to the control, we can talk about increasing the level of knowledge and minimizing the ability to guess the right answers.

The capabilities of the above-mentioned software, including the Excel spreadsheet, make it possible to establish the level of correlation between the test results and the student's current scores (see Figure 5).

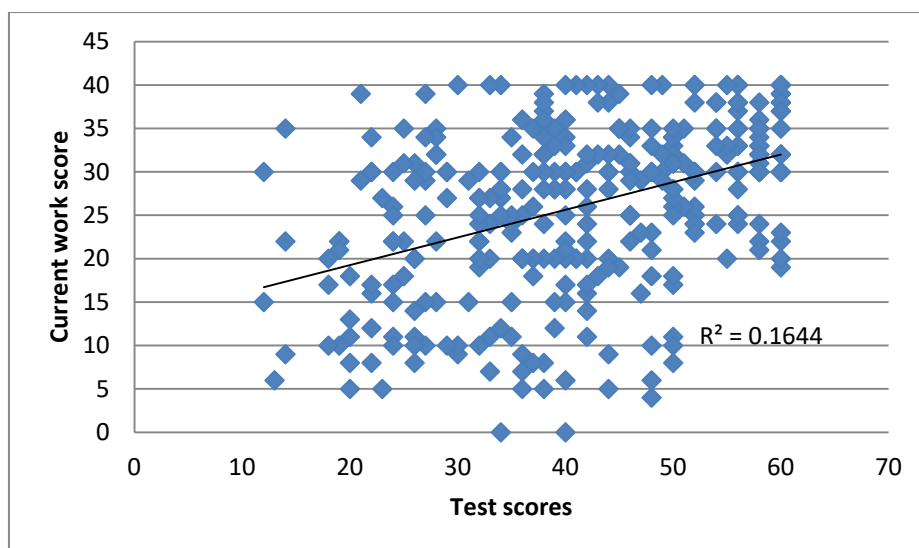


Figure 5. Graphical display of test scores and current work scores.

CORREL shows that Pearson's linear correlation coefficient is $r = 0.41$.

The hypothesis of the significance of the sample correlation coefficient is further tested ($t=7,96 > t(0.05; 322)=1.97$; TINV). This indicates a direct correlation of the average level. Therefore, there is a direct relationship between the test results and the students' current work. At the same time, an average rather than a high correlation coefficient may indicate one of two cases: 1) students who, for some reason, may not be entirely dependent on them, did not receive the desired number of scores during their studies, improved their test scores; 2) students who successfully completed the semester were unable to cope with the tasks (possibly due to excitement).

Since there is a direct correlation between the test results and the students' current work and the mean values are not significantly different, it is possible to ask whether it is appropriate to align the maximum possible score (go from 60/40 to 50/50). Testing results require further investigation.

It is advisable to attach the appropriate Moodle module (“Test Control” → “Results” → “Statistics” to the test results for processing). Based on the research of Victoria O. Koretska and Svitlana O. Shlianchak, we analyze the obtained indicators and interpret them in the context of the study [16].

The standard deviation for the test data is 20.2%, while the standard deviation is 12-18%. We will assume that the result obtained is slightly different from the norm. We can conclude that the estimates are not close to average.

Score distribution skewness is negative: -0.24. Left side skewness (see figure 4). Yes, values that are larger than average occur in the distribution. In other words, it is advisable to complicate the test. At the same time, the skewness value is slightly different from zero ($t_a = 0.17 < 3$), so the indicator can be considered satisfactory. Score distribution kurtosis is -0.82. We have a planar vertex distribution. The kurtosis value clearly shows the shape of the peak distribution. A negative value large enough for the module means that the test results are quite scattered relative to the mean.

Let us illustrate the preliminary conclusion more clearly. Let's translate the test scores into a 100-score scale and divide the results by four possible levels: “excellent” (90-100), “good” (71-89),

“satisfactory” (50-70), “unsatisfactory” (0-49). 62 students (19.1%) were tested for “excellent”; to 'good' 84 (25.9%); by “satisfactory” 111 (34.3%); at “unsatisfactory” 67 (20.7%).

Coefficient of internal consistency. The internal consistency ratio should exceed 64%. According to statistics, it is 70.3%, which is a satisfactory indicator. Yes, in a test, each individual test task correlates with the test as a whole, but retains minimal correlation with other test tasks. The correlation between even blocks and odd blocks was additionally investigated, which is respectively 0.38 and 0.32 and is noticeable ($t=7.30 > t(0.05; 322)=1.97$; $t=6,04 > t(0.05; 322)=1.97$).

Error ratio. An attitude error determines the percentage of standard deviation that can occur through chance, not as a result of differences between students' knowledge. A value greater than 50% cannot be considered satisfactory as it indicates a high probability of randomness in the test results. The statistics indicate a value of 51.2%, which is a negative result. Standard error. The standard error is at the level of 10.8% and slightly different from the maximum value – 8%.

Despite the fact that the student actually had to complete 29 tasks during the test, the evaluation of the results can only be done by blocks, not the result of each choice individually. This is due to the specifics of the discipline. After all, not individual fragmentary knowledge was tested, but the ability to work with the text, awareness of its content in general. We will assume that the tasks of the same blocks in different topics are equivalent.

Of course, in terms of the structure of the block, this is the case, in terms of content – the tasks cannot be exactly the same. But at least the teachers tried to reach maximum equivalence.

Let's analyze the complexity of the test by blocks. We find the percentage of correct answers and subtract it from 1. Yes, the coefficients of complexity of tasks 1 and 2 of the block are 0.3; 3 blocks – 0.2; 4 blocks – 0.4. So, the complexity of the blocks is moderate, but close to low. The test should be complicated.

Table 2 lists student scores for each block.

Table 2. Distribution of test scores by blocks.

Student	Block 1	Block 2	Block 3	Block 4
1 Student1	4.8	16.0	14.0	6.0
2 Student2	12.0	6.0	14.0	16.0
... ..				
324 Student324	12.0	16.0	16.0	16.0
Average	8.6	10.9	12.2	8.9
The maximum number of scores	12	16	16	16
correct answers	0.72	0.68	0.76	0.56
Block complexity factor	0.28	0.32	0.24	0.44

Let's check the correlation between the scores for each block and the average of the test results. Thus, for 1 block, the correlation is 0.59; for 2 parties - 0,76; for block 3 - 0.69; for block 4 - 0.78.

Therefore, the correlation is quite strong, which is a positive indicator. The test tasks really divide students with higher and lower levels of competence.

We analyze the standard deviation, the kurtosis value and the skewness of each block separately (table 3).

Although the questions are randomly selected from the category, Moodle provides a statistical analysis of this situation as well. The Statistics module covers issues that reflect extreme cases (with the highest and lowest complexity). Note that the test developed did not contain any question marked in red in this module, which is a positive result and indicates that there is no need to remove any question from the test bank.

Table 3. Standard deviation, kurtosis and skewness value of each block.

	Block 1	Block 2	Block 3	Block 4
Standard deviation, %	30.11	29.55	21.15	31.52
Skewness	0.80	0.51	0.66	0.02
Kurtosis	0.52	0.93	0.20	1.31

An analysis of the time students spend on completing the test shows that on average, students complete the work in 21 minutes. Given that the time of the task is a normally distributed random variable, let's test the hypothesis that it is substantially less than half of the allotted time ($p^* = 0.5$).

According algorithm Tests of the Population Proportion (Large Sample Sizes) $z = -0.95 > -z(0.05) = -1.65$. That is, the students completed the work in a time that is not significantly less than half of what was planned. Therefore, there is no need to reduce the time to complete tasks or to increase the number of tasks in the test. It is more expedient to supplement the test bank with new questions.

It should be noted that the correlation between the time of the test and its result is inversely proportional. The dependence is noticeable, the sample correlation coefficient ($r = -0.3$) is statistically significant ($t = -4.73 < -t(0.05; 322) = -1.97$). This suggests that the better the student is ready for the exam, the less time he/she needs to complete the tasks and the higher the score he/she gets.

The survey of students showed that the majority of them (71.3%) have a positive attitude towards the procedure of final electronic testing. Although the assessment situation is in any case an exhilarating one, the factor of human interaction is minimized, which is a favorable factor for most students. Teachers (65.5%) say that the preparatory phase of testing, including the formation of a test bank, its verification and initial testing, requires considerable effort. At the same time, further use of the e-test greatly simplifies the process of evaluating students' learning outcomes, and eliminates the teacher from routine work (writing tests, oral interviews, etc.), which is inevitable during traditional control.

The comparison of the final foreign language proficiency assessment test results within blended and distance-learning during the quarantine period. Two samples with scores of final testing according to the chi-square criterion were checked for homogeneity. It was found that the frequency distributions according to the levels of "unsatisfactory", "satisfactory", "good", "excellent" in the considered samples do not differ significantly. At the same time, computer-based testing cannot completely replace traditional methods of learning and knowledge control, but only become an essential complement to them.

6. Conclusions

Taking into consideration the review of the psychological and pedagogical, educational and methodological literature and materials as well as practical experience it has been concluded that challenges in the use of ICT and conducting final assessments in distance education during the quarantine period are a current scientific and practical issue which has many aspects and is far from being finally solved.

Over the course of the research the importance of the use of Moodle in the future teacher preparation process as one of the key online-environments for organizing distance learning during quarantine has been confirmed.

During the final assessments conducted to measure students' progress and performance and the analysis of the obtained results the advantages of the test developed by the part of the author team have been identified. Through the profound analysis of the previously obtained results via the applied method of mathematical statistics the proper conclusions on test validity and reliability can be reached. By taking into account the statistical data analysis it is possible to optimize the conditions of test conducting, in particular, to adjust the time limit required to accomplish the task.

Recommendations for improving the procedure of controlling students' academic achievement by means of the Moodle electronic testing are formulated. It is important to improve the quality of education by analyzing the results, including research to identify the relationship between current and final grades, test scores and duration. It is necessary to check the reliability of the test tasks separately and the test as a whole, etc.

It has been found that the attitude of students and teachers to performing electronic tests in Moodle is generally positive.

It has been confirmed that, in the presence of a quality test bank, Moodle testing can be one of the most effective means of ultimately controlling students' knowledge.

The engagement of students in the use of the Moodle platform and its mobile application enables to ensure interactivity and constructive feedback in the distance learning. Students should be provided with the opportunity to overview the structured learning materials hosted by the system, schedule a test at a time and location that is convenient for them.

It has become crucially important to create a bank of high-quality online resources at the state level in order to ensure education of high-quality during the quarantine and in general.

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