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Peer learning and peer assessment in institutions of higher education

Aprendizaje entre pares y evaluación entre pares en instituciones de educación superior

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Abstract

The article examines the types of control and the most important principles of evaluating the knowledge of higher education students; the advantages of the modular rating system for the organization of training and training in "peer-to-peer" or peering training conditions are shown; the basis of peer learning is considered and various definitions of peer assessment are proposed. The basis of peering interaction is Web 3.0 technologies, the Internet, a large number of open educational resources (OER), and mass digitization of various materials. Peer 2 Peer University (P2PU) is an example of peering interaction and its successful functioning system. The system of peering interaction using ICT is revealed and the possibilities for peering assessment, which are provided in the applications of research learning spaces, are shown. The features of peer evaluation and consideration of these features when developing evaluation criteria are described. Based on the results of the ascertainment experiment and the conclusions regarding the renewal and improvement of the educational sector, in general, and the evaluation of higher education applicants, in particular, a model of digital tools and methods of introducing peer evaluation into the educational process of higher education institutions was introduced into the educational process of higher education institutions.

Keywords: peer learning, peer assessment, higher education institutions, peer interaction, peer-to-peer.

Resumen

El artículo examina los tipos de control y los principios más importantes de la evaluación de conocimientos de los estudiantes de educación superior; se muestran las ventajas del sistema de calificación modular para la organización de la formación y la formación en condiciones de formación "peer-to-peer" o entre pares; Se consideran las bases del aprendizaje entre pares y se proponen varias definiciones de evaluación entre pares. La base de la interacción entre pares son las tecnologías Web 3.0, Internet, una gran cantidad de recursos educativos abiertos (REA) y la digitalización masiva de diversos materiales. Un ejemplo de interacción entre pares, cuyo sistema de funcionamiento exitoso es Peer 2 Peer University (P2PU). Se revela el sistema de interacción entre pares utilizando las TIC y se muestran las posibilidades de evaluación entre pares que se brindan en las aplicaciones de los espacios de aprendizaje en investigación. Se describen las características de la evaluación por pares y la consideración de estas características al desarrollar criterios de evaluación. A partir de los resultados del experimento de verificación y las conclusiones sobre la renovación y mejora del sector educativo, en general, y la evaluación de los solicitantes de educación superior, en particular, se presenta un modelo de herramientas y métodos digitales para introducir la evaluación entre pares en el proceso educativo. de las instituciones de educación superior se introdujo en el proceso educativo de las instituciones de educación superior.

Palabras clave: aprendizaje entre pares, evaluación entre pares, instituciones de educación superior, interacción entre pares, entre pares.

Introduction

The purpose of modern institutions of higher education is to teach students to learn and act in conditions of uncertainty, and not only to impart skills, knowledge, or certain skills. Innovative assessment is necessary to achieve the goal set by the teacher (Boiko, 2023).

It is increasingly common to see that the educational process cannot be modernized in the 21st century without considering changes aimed at global educational standards. Educational reforms that take on an international character go beyond the borders of one state. In the educational space of society, innovative technologies, in particular digital ones, are being introduced, which inevitably cause the need to improve and rethink pedagogical methods, that is, the emphasis is shifting towards personality development. Modern education, which is in the process of reconstruction and transformation, strives to meet international standards, adapts to the requirements of the labor market and modernity, and seeks new technologies and methods. The educational process is constantly searching for various tools to ensure

independent self-organization and research activities of students. With the emergence of a large number of mass open online courses and the introduction of distance and mixed learning, the innovative technology of peer learning, which includes peer assessment, is becoming more and more widespread (Morze & Buinytska, 2021).

An important means of increasing the efficiency of the educational process of a higher school is the creation of a stimulating system for the control of educational work for students of higher education. In an institution of higher education, training should be potentially oriented both to the high-quality professional training of future specialists by their specialization, and to the training of such specialists who have the skills and knowledge for effective innovative evaluation of the educational achievements of their subordinates (Maksymchuk et al., 2023). Therefore, peer evaluation in institutions of higher education is an important strategy that involves one person making decisions about the work of other people, which occurs when specialists work together on educational tasks or joint projects.

Despite the interest in peer learning and peer assessment in higher education institutions, it remains insufficiently studied, as it is mainly aimed at improving traditional approaches to the organization of education. Its solution becomes possible, in our opinion, thanks to the introduction of educational innovations, in particular, the development of technologies based on the use of mutual learning ideas in the process of mastering professional knowledge and skills, which will ensure the creation of a favorable atmosphere for all subjects of educational activity.

The development of peer learning and peer assessment in higher education institutions is currently an urgent issue of the theory and methodology of learning in the educational process. Based on this, we considered the following questions in the article:

- Types of control and the most important principles of knowledge assessment of higher education students.
- The modular rating system of the training organization.
- Education in "peer-to-peer" conditions, or peering education.
- System of peering interaction using ICT.
- Advantages of peer learning.
- Possibilities for peer assessment are provided in the exploratory learning spaces applications.
- Features of peer evaluation and consideration of these features when developing evaluation criteria.

Literature Review

We will analyze the achievements of scientists who focus their research on changes in the practice and theory of evaluating the educational achievements of students of higher education in the context of focusing on person-oriented learning, in particular the recognition of the formative function of evaluation when students of the educational space are involved in the development and use of evaluation criteria, in peer evaluation and self-assessment, and not only become observers of the teacher's assessment process.

Researchers N. Morze, & V. Vember (2019) presented the trends and features of the implementation of peer assessment in the educational process of higher education institutions, identified the disadvantages and advantages of peer and traditional assessment, and highlighted the essential features of peer and formative assessment. Among the ways to avoid the shortcomings of traditional assessment proposed by scientists is the introduction of ICT tools to support peer assessment and the combination of peer and traditional assessment.

A. Hryvko, & L. Vashchenko (2021) devoted their scientific work to determining the place of current and formative assessment of students. In the research process, it was established that the primary priority is the method and strategies of using these types of assessments by the teacher. Scientists have proven that the current and formative assessment do not replace, but complement each other. The positive and

negative aspects of formative educational assessment based on the activity approach and formative diagnostic assessment based on the instrumental approach were substantiated.

The same problem, namely: features and ways of applying formative assessment in institutions of higher education, was investigated by E. Bazhmina (2020). She presented six conditions in higher education that are effective in formative assessment – the presence of feedback from students, tracking the achievement of the set goal by each student, formulating learning goals in the group, using assessment tools to create a culture of encouragement, using different approaches, different methods training for the assessment of higher education applicants, their active involvement in training. There should be constant interaction between students of higher education and the teacher to achieve the goal of formative assessment and teaching, in general, to teach to learn. O. Boiko's (2023) study reveals the theoretical aspects of the main types of assessment, the study is devoted to the problem of assessment in English language classes. The results of research on the main types, methods, and means of evaluation are highlighted. Z. Mohamadi (2018) in his study, compared the effects of online formative and summative assessment.

So, we can see that the majority of research by scientists is devoted to the theoretical aspects of assessment, in particular, studies of traditional and computer-based assessment, a comparison of formative and summative assessment, and only isolated studies talk about the importance of peer assessment for education and the introduction of peer assessment into the educational process of higher education institutions.

Therefore, the need to analyze peer learning and peer assessment in higher education institutions is due to the presence of contradictions between:

- The need to form a creative personality and the limitations of available methods of professional and pedagogical training;
- The collective nature of education and the individual process of assimilation of students' knowledge;
- Modern requirements for the quality of professional training of specialists and ways of their implementation;
- The possibilities of choosing methods of training a specialist in practice and the lack of scientifically based technologies for the organization of mutual learning.

The topicality of the problem and its insufficient theoretical and practical elaboration led to the choice of the topic of the article.

THE PURPOSE OF THE ARTICLE is to determine the features and outline the advantages of innovative technologies in the field of assessment over traditional, digital tools and methods of implementing peer assessment in the educational process of higher education institutions.

THE RESEARCH HYPOTHESIS is that awareness of the disadvantages and advantages of peered and traditional assessment will help educators to effectively combine peered and traditional assessment in higher education institutions.

Methodology

In the process of scientific research, the following research methods were used:

- ***Theoretical***: analysis, comparison, and systematization of methodical, educational, and scientific literature on the subject of research, which outlined the directions of development of progressive advanced ideas in this field, made it possible to realize the shortcomings of peering and traditional evaluation and their advantages, to find out the level of scientific development of the research problem, to determine methodical principles of the raised problem;

- ***Empirical***: indirect and direct observation, surveys, and questionnaires, which made it possible to systematize and generalize statistical and analytical material; a pedagogical experiment to reveal the real state of innovative technologies in the field of assessment over traditional, digital tools and methods of introducing peer assessment into the educational process of higher education institutions;
- ***Mathematical***: (ranking, mathematical analysis, data processing);
- ***Statistical***: for statistical digital processing, summarization of the obtained results.

When determining the sample of respondents, the general specificity of the research subject was taken into account, that awareness of the disadvantages of peering and traditional assessment and advantages will help teachers to effectively combine peering and traditional assessment in institutions of higher education.

The total sample size is 184 respondents, from which the control (94 people) and experimental (90 people) groups were formed. When forming the sample, the criteria of equivalence, representativeness, and content were taken into account.

The choice of research methods was determined by the possibilities of the method itself, its reliability, and its validity.

The questions as a result of the research for the respondents are aimed at understanding the set goals, the ability to apply innovative and interactive knowledge assessment technologies regarding the organization of the learning process, decision-making flexibility, clarifying the assessment of the pedagogical situation, mastering pedagogical skills in peering and traditional assessment.

We have identified three levels of implementation of peer assessment in the educational process of higher education institutions (high, medium, and low).

The sample was formed using the technical procedure of calculating the selection step by random selection. To identify changes and conditions in the levels of training of future specialists for the organization of digital tools and methods of implementing peer evaluation in the educational process of higher education institutions in both groups, a research procedure was implemented using several diagnostic methods.

We applied Pearson's $\chi 2$ homogeneity criterion in the priorities of CG and EG students to assess the statistical reliability of the identified changes to select digital tools and methods for implementing peer evaluation in the educational process of higher education institutions. What is quite productive: when comparing frequency distributions that were formed based on the results (carried out in this same group) of two measurements of the characteristic under study; when comparing the frequency distributions of the same characteristic that was measured in two groups.

The generalized answers of the respondents showed that before the experiment, 86.0% of the respondents of the CG and 83.7% of the EG students noted that they assessed the level of preparation for the introduction of peer assessment in the educational process of higher education institutions as low and medium. The shares of respondents with a high level of self-esteem regarding evaluation are quite small: 14.0% in CG and 16.3% in EG.

After the formative stage of the experiment, significant statistical changes in the distributions were observed in EG due to a significant decrease (by 24.3%) in the number of higher education applicants with a low level of peer evaluation opportunities and an increase (by 18.4%) in the share of such respondents who evaluate as this level is high. There was also an increase (by 47.8%) of respondents with an average level. So, we state that in the process of the formative experiment, the measures carried out helped to increase the level of implementation of peer evaluation in the educational process of higher education institutions among EG respondents, which testifies to the effectiveness of the proposed model.

Results and Discussion

Types of control and the most important principles of knowledge assessment of higher education students.

Traditionally, the same types of control are used in the educational process of higher education institutions: current, preliminary, thematic, final, periodic, and final (Leleka et al., 2022).

It should be noted that the most important principles of knowledge assessment of students of higher education are: thematic orientation, individual nature of knowledge assessment, demandingness, differentiation, objectivity, systematicity, and motivation. It is these principles that determine the criteria for the norm of knowledge evaluations of students of higher education, which include in their content a list of conditions by which the teacher is guided when evaluating the success of students of higher education because the criteria of evaluations are considered to be the rules that the teacher himself takes into account when assigning evaluations. Taking into account the specifics of specific disciplines and assessment criteria, requirements are set for the assessment of knowledge when using different types of control (Sulym et al., 2023). Such an evaluation system does not satisfy modern higher education. The main reasons for this are the rapid accumulation of knowledge before and after the session their rapid forgetting, and insufficient motivation for learning (Budnyk et al., 2022).

The modular rating system of the training organization.

The application of the modular rating system justifies the experience of many European states. Because it is with such an approach that the education process is significantly simplified, and the knowledge assessment system is more transparent. The teacher can constantly monitor the educational process. It is the modular rating system of classes that creates such an organization of learning, which, according to the principle of modularity, provides for the study of the material with the subsequent rating assessment. At the same time, the module is a logically complete system of actual skills and theoretical knowledge from a certain educational discipline with a determined optimal time for organizing its assimilation and adapting to the individual characteristics of students of higher education (Altameemi & Alomaim, 2022). Each academic discipline consists of modules – according to the modular rating system of the organization of education. Modules are a long-term activity where strategic tasks and goals are set; internal motivational urges are thought through; a program of implementation of the planned goals is drawn up; monitoring of the success rate of higher education applicants and the implementation of the program is carried out. The organization of such an educational process makes it possible to fully implement the components of the cycle of knowledge acquisition: comprehension, perception, memorization, awareness of new knowledge, formation of relevant abilities and skills, systematization, and generalization of knowledge. Under such conditions, the opportunity to catch up on material not learned in time and to analyze the level of mastery of the educational discipline increases, as well as the time for independent individual work increases and the role of collective forms of learning increases. In educational practice, the rating is considered a numerical value, which, as a rule, is a comprehensive indicator of the quality of knowledge of a student of higher education, expressed on a multi-point scale and compared with the success of his peers in several or one subjects during a certain period of study (semester, year, module, etc.). The sum of grades accumulated during a certain period of study is a quantitative indicator of the quality of work of a student of higher education. A student of higher education, performing specific work, should know in advance what the minimum number of points or the maximum he can receive as a result of successful activity. It is necessary to know the conditions that make it possible to automatically take the semester exam, issue a credit, etc., and under which the student of higher education will score the highest number of points. A student of higher education should receive different points for different forms of control, depending on the difficulty of the task (Dzhurynskyi et al., 2023).

The main requirements for applying the rating are methodical support, implementation of appropriate preparatory work, the readiness of teachers and students of higher education, and independent work of

students of higher education. In the context of global trends in the development of the educational sphere, the introduction of a rating assessment of success in institutions of higher education of students of higher education makes it possible to say that modern methods of educational achievements of students of higher education and control of knowledge increase objectivity in assessment, form a more responsible attitude to learning, reduce the psychological burden during the exam, strengthen the motivational component, introduce healthy competition, turn control into an active component of the management process and form the independence of actions of higher education applicants (Yakimenko et al., 2023).

Education in "peer-to-peer" conditions, or peering education.

It is necessary to fundamentally review the state of education, and compare and analyze it with European standards to determine the direction of approach to the world and European scientific and educational space and improvement at the current stage of development of each state. The problem of the quality of knowledge assessment of higher education seekers is an important element of the educational process and requires substantiation, understanding, approbation, and development of promising methods and technologies and the creation of systems of their formation adapted to the modern educational space; definition of successful learning (Plakhotnik et al., 2023).

Peer-to-peer training, or peering training, aims to actively involve all participants in the educational process. Let's consider what is at the basis of peering training:

- Equality of all students of higher education;
- With the help of the organization of interaction of higher education seekers to solve set tasks;
- A pronounced subject-subject character of communication of higher education seekers, aimed at achieving the set pedagogical goals;
- Taking into account the influence of each student of higher education on the network community;
- Taking into account the influence of the community on each of the students of higher education.

The content of peer assessment is recognized as an integral part of formative assessment and has a different focus than self-assessment. The researchers "consider peer assessment as an independent strategy, but more often it is considered complementary to self-assessment" (Kuchai et al., 2017).

The definitions of peer evaluation are quite diverse:

- Peer evaluation, which involves the assessment by a higher education student of the results of the educational activities of another higher education student;
- Peer assessment is a strategy that involves higher education students making "decisions about other people's work that usually occur when students work together on joint projects or learning tasks" (Plakhotnik et al., 2022);
- Peer evaluation is an assessment by a higher education student of the results of the educational activities of another higher education student (Boiko, 2023);
- Peer evaluation is "synonymous with peer evaluation in theses" (Kanivets, 2012).

System of peering interaction using ICT.

The specificity of peering interaction, and peering education with the use of ICT lies in the innovativeness of such opportunities that did not exist before. The basis of peering interaction is Web 3.0 technologies, the Internet, a large number of open educational resources (OER), and mass digitization of various materials. Peer 2 Peer University (P2PU) is an example of peering interaction and its successful functioning system.

Thematic blogs can also serve as a means of peering (Nedder et al., 2017). Scientists, in the field of professional education, recorded an increase in interest in the educational material of students of higher

education, proving the effectiveness of blogging for the systematic improvement of the qualifications of specialists, since students of higher education could freely create forums for discussion, submit innovative material, feeling interest among their colleagues in publications and project support. Peer-to-peer interaction provides convenient access to resources and an opportunity for a friendly and professional atmosphere; mutual assistance promotes the ability to cooperate, respond quickly to innovative educational challenges in the educational space, develop professional qualities, and be tolerant of other opinions.

Advantages of peer learning.

The advantages of peer education are (Morze & Vember, 2019):

- Quick reaction to changes in the market situation;
- Increasing the level of compliance with educational, socio-cultural, and socio-economic needs of society, and new market requirements;
- Adaptability of specialists, and educational organizations to rapidly changing conditions;
- Elimination of duplication of several functions by participants of network interaction;
- The concentration of activities of network interaction participants on their key academic and professional competencies, innovative unique processes taking place in the field of education;
- Involvement of competent participants in the implementation of joint professional and academic activities, possessing the necessary resource potential;
- In the process of achieving certain results, the implementation of partnership relations;
- Increasing the rates of generation, rates of efficiency, and translation of specialized knowledge;
- Replication of best practices, increasing the efficiency of information exchange mechanisms and innovative practices among participants of informal network interaction;
- The absence of temporal and spatial restrictions;
- Desire and readiness for changes by the requirements of a changing world, a high level of innovative activity, and increasing requirements for the level of professionalism of a specialist.
- Increasing the level of competitiveness of peering training participants.

So, we can see that the specificity of peer education, where peer assessment is a component, is that it consists of opportunities that did not exist before. Web 3.0 technologies, the Internet, a large number of open educational resources, and mass digitization of various materials are its basis (Morze et al., 2017). During peer learning and peer assessment, teachers work together with students of higher education to provide comprehensive support, help in designing assessment and their own education strategy, and act as tutors, mentors, and facilitators (Morze & Vember, 2019).

Possibilities for peer assessment are provided in the exploratory learning spaces applications.

To provide peer assessment, user-friendly applications Table Tool, Question Scratchpad, and Peer Assessment Tool have been developed. Peer evaluation can also be implemented using Google applications. There are also possibilities for peer assessment in applications of inquiry learning spaces (Inquiry Learning Space – ILS). Which, using the tools of the Graasp platform, can be created by students of higher education (website address: http://graasp.eu).

During peering, students of higher education should be aware of the specifics of assessment, access to necessary resources, and the ability to work in a group and individually. It is important to take this into account during the educational process at a higher education institution (Karhut et al., 2023).

Features of peer evaluation and consideration of these features when developing evaluation criteria.

Peer evaluation features include:

– Organization of work of students of higher education in groups or pairs to evaluate each other;
– The presence of clear wording for evaluation criteria,
– Application of the principle of double anonymity: applicants of higher education do not know who evaluated them and applicants of higher education do not know who they are evaluating.

When developing evaluation criteria, it is taken into account that:

– The work of students of higher education is compared not with the work of other students of higher education, but with the model proposed by the teacher and evaluated according to the criteria;
– The criteria are aimed at evaluating the work of higher education applicants (at the final or intermediate stage);
– A student of a higher education institution must use a clear evaluation algorithm, according to which the student of higher education can independently determine his evaluation and his level of achievements;
– Criteria for higher education applicants should be known in advance. "The evaluation criterion is a concrete expression of the degree of achievement of educational goals. You can only evaluate what is taught" (Morze et al., 2017).

Experimental study.

The implementation of the pedagogical experiment was carried out in three stages: preparatory, main, and final.

At the preparatory stage, the purpose and tasks of the research were defined, the experimental plan was developed, methods of measurement and processing of results were selected, control and experimental groups were selected, and their homogeneity was checked.

At the main stage, an experiment was conducted.

At the final stage, the results of the experiment were analyzed, their reliability was confirmed, and conclusions were drawn about the pedagogical effect of the experiment.

The reliability and validity of the obtained results, and the objectivity of their evaluation were ensured by the methodological validity of the initial positions and the qualitative mechanism of the assessment of the quality under study, the use of a complex of complementary research methods, and the involvement of a group of respondents from a higher educational institution in the analysis of its results.

To assess the homogeneity of experimental and control data, statistical processing was performed using MS Excel and SPSS (Statistical Package for Social Science).

In our study, we consider peer evaluation in higher education institutions as an important strategy that involves one person making decisions about the work of other people, which occurs when specialists work together on educational tasks or joint projects. We consider peer evaluation in institutions of higher education to be complex, dynamic, and necessary, such that it is represented by the interaction of subjective (taking into account the level of professional mastery by the future profession of the future specialist and his psychological and pedagogical qualities and processes of professional self-development) and objective (educational space) reality.

We took into account the main provisions of psychological and pedagogical science when developing the experiment program, which relates to the problem of defining features, outlining the advantages of innovative technologies in the field of assessment over traditional ones; digital tools, and methods of implementing peer assessment in the educational process of higher education institutions.

When determining the sample of respondents, the general specificity of the research subject was taken into account, that awareness of the disadvantages of peering and traditional assessment and advantages will help teachers to effectively combine peering and traditional assessment in institutions of higher education.

The total sample size is 184 respondents, from which the control (94 people) and experimental (90 people) groups were formed. When forming the sample, the criteria of equivalence, representativeness, and content were taken into account.

In the course of the experimental study, features were determined, outlining the advantages of innovative technologies in the field of evaluation over traditional ones, digital tools, and methods of introducing peer evaluation into the educational process of higher education institutions.

The study hypothesized that awareness of the disadvantages and advantages of peered and traditional assessment will help teachers to effectively combine peered and traditional assessment in institutions of higher education.

Preparatory stage.

In the process of scientific research, the following research methods were used: theoretical: analysis, comparison, systematization of methodical, educational, scientific literature on the subject of research, which outlined the directions of development of progressive advanced ideas in this field, made it possible to realize the shortcomings of peering and traditional evaluation and their advantages, with clarify the level of scientific development of the research problem, determine the methodological principles of the problem; empirical: indirect and direct observation, surveys, questionnaires, testing, diagnostic methods, which made it possible to systematize and summarize statistical and analytical material; a pedagogical experiment to reveal the real state of innovative technologies in the field of assessment over traditional, digital tools and methods of introducing peer assessment into the educational process of higher education institutions; mathematical: (ranking, mathematical analysis, data processing); statistical: for statistical digital processing, summarization of the obtained results.

The choice of research methods was determined by the possibilities of the method itself, its reliability, and its validity.

The questions as a result of the research for the respondents are aimed at understanding the set goals, the ability to apply innovative and interactive knowledge assessment technologies regarding the organization of the learning process, decision-making flexibility, clarifying the assessment of the pedagogical situation, mastering pedagogical skills in peering and traditional assessment.

We have identified three levels of implementation of peer assessment in the educational process of higher education institutions (high, medium, and low).

The ***high level*** of implementation of peer evaluation by respondents in the educational process of higher education institutions – high flexibility and predictability in decision-making, possession of innovative and interactive technologies for the organization of peer evaluation at a creative and professional level.

The ***average level*** is insufficient awareness of respondents with the possibilities of implementation and application of forms and methods of peer evaluation, the use of digital tools and methods of implementation of peer evaluation in the educational process of higher education institutions at the reproductive-adaptive level, and partial readiness for self-improvement.

The ***low level*** – lack of independence, insufficient mastery of innovative and interactive technologies regarding the organization of peer evaluation in the educational process of higher education institutions, weak introspection of one's own professional capabilities, and passivity in decision-making.

The sample was formed using the technical procedure of calculating the selection step by random selection. To identify changes and conditions in the levels of training of future specialists for the organization of digital tools and methods of implementing peer evaluation in the educational process of higher education institutions in both groups, a research procedure was implemented using several diagnostic methods.
Main stage.

Summarizing the answers of the respondents regarding their priorities in the choice of assessment forms allows us to state that before the experiment, a significant part of the respondents of the experimental (39.7%) and control (41.7%) groups declared that they were supporters of the use of traditional survey forms (the average level in determining priorities regarding the choice of assessment forms).

At the ascertainment stage of the experiment, the following results were obtained: in CG (28.7%) and EG (26.8%) respondents indicated that they prefer the use of standard forms of evaluation, which provide for strict regulation in the educational process (low level).

Table 1.
Results of the ascertaining stage of the experiment

Group	%
Control Group (CG)	28,7
Experimental Group (EG)	26,8

The possibilities of implementing digital tools and methods of implementing peer evaluation in the educational process of higher education institutions are underestimated by students of higher education, as a small number of respondents indicated that the use of peer evaluation in the educational process of higher education institutions is a priority for them (high level). So, we can say that a significant part of future specialists in their future professional activity is oriented toward the implementation of the traditional assessment paradigm in the organization of the educational process.

However, at the current stage of the educational space, the formation of a creative and competitive personality is required, capable of quickly switching to other types of activities, producing non-traditional ideas, adapting to new conditions, showing creativity in work, thinking critically, successfully communicating with others, being able to use digital tools and methods of peer evaluation in the educational process. It is impossible to achieve these goals when implementing traditional assessment, therefore it is necessary to change approaches to education by introducing digital tools and methods of peer assessment into the educational process of higher education institutions.

It is necessary to move from prescriptive and cognitive assessment of the knowledge of higher education seekers to the introduction of digital tools and methods of peer assessment in the educational process of higher education institutions and to achieve reflective, activity-based, competency-based approaches and a personally oriented paradigm in the educational process.

Final stage.

Based on the results of the ascertainment experiment and the conclusions regarding the renewal and improvement of the educational sector, in general, and the evaluation of higher education applicants, in particular, a model of digital tools and methods of introducing peer evaluation into the educational process of higher education institutions was introduced into the educational process of higher education institutions. Based on the results of the implementation of such a developed model, we conclude that after the formative experiment in EG, the shares of respondents who are supporters of using traditional assessment (33.2%,

dynamics – 8.9%) and prescriptive (16.7%, dynamics – 12.1%). The number of respondents who support digital tools and methods of implementing peer evaluation in the educational process of higher education institutions increased by 20.6%.

In the context of our research, the fact that the number of respondents in EG increased (by 13.1%) and understanding that the use of digital tools and methods of implementing peer evaluation in the educational process of higher education institutions not only ensures better assimilation of knowledge by students of higher education and the formation of skills and abilities in them, as well as increasing the ability for reflection, self-development, independence, productive interpersonal interaction, analysis of the evaluation situation from one's own position, managing emotions, correcting and comparing one's capabilities and interests, building partnership interaction in the team when implementing peer evaluation in the educational process of institutions of higher education.

Pearson's χ2 data is a convenient statistical method for performing frequency change analysis. This most valuable tool has primarily been used to analyze data that takes into account the combined effect of a particular factor on an outcome. During the experiment, Pearson's χ2 supported the analysis of the influence of risk factors by calculating relative and absolute risks, as well as odds ratios.

We applied Pearson's χ2 homogeneity criterion in the priorities of CG and EG students to assess the statistical reliability of the identified changes to select digital tools and methods for implementing peer evaluation in the educational process of higher education institutions. What is quite productive: when comparing frequency distributions that were formed based on the results (carried out in this same group) of two measurements of the characteristic under study; when comparing the frequency distributions of the same characteristic that was measured in two groups.

To diagnose the state and changes in the respondents' levels of self-research, psychological and pedagogical skills of self-knowledge, consequences, and causes of digital tools and methods of introducing peer evaluation into the educational process of higher education institutions, the ability to understand the meaning of evaluation, readiness for perception, self-development of the participants of the educational process were used: the questionnaire "Readiness for the organization of digital tools and methods of implementing peer evaluation in the educational process of higher education institutions."

During the experiment, the respondents were asked to evaluate their level of practical training in solving problems related to the organization of peer evaluation in the educational process of a higher school.

The generalized answers of the respondents showed that before the experiment, 86.0% of the respondents of the CG and 83.7% of the EG students noted that they assessed the level of preparation for the introduction of peer assessment in the educational process of higher education institutions as low and medium. The shares of respondents with a high level of self-esteem regarding evaluation are quite small: 14.0% in CG and 16.3% in EG.

After the control stage of the experiment in CG, the situation practically did not change: in particular, with a high level of self-esteem, the share of higher education applicants increased, about practical training for the introduction of peer assessment in the educational process of higher education institutions (+3.3%) and decreased by 3.4% the number of respondents who rate the level of digital tools and methods of implementing peer assessment in the educational process of higher education institutions as low. These changes in distributions, as the test showed, are random.

After the formative stage of the experiment, significant statistical changes in the distributions were observed in EG due to a significant decrease (by 24.3%) in the number of higher education applicants with a low level of peer evaluation opportunities and an increase (by 18.4%) in the share of such respondents who evaluate as this level is high. There was also an increase (by 47.8%) of respondents with an average level. So, we state that in the process of the formative experiment, the measures carried out helped to increase

the level of implementation of peer evaluation in the educational process of higher education institutions among EG respondents, which testifies to the effectiveness of the proposed model.

Research is largely dependent on the accuracy and reliability of the data. In the framework of research work, the quality of data collection and analysis not only adds weight to the research but also contributes to the formation of sound conclusions, which is the key to academic success.

The following digital data collection tools were useful in the study:

- Google Forms – a simple tool for creating surveys that allows you to collect data from respondents, create different types of questions, and collect answers in spreadsheets.
- SurveyMonkey – a modern survey tool that offers a wide range of customization options and analytical tools for analyzing the collected data.
- JSTOR, Google Scholar, and other academic search engines provide access to scholarly articles, books, and other academic resources that may be useful for literature review and theoretical data collection.
- Zotero or Mendeley – bibliography management programs that help organize research materials, store references, and format bibliographies and citations according to different citation styles.
- Microsoft Excel or Google Sheets – spreadsheets are useful for organizing and analyzing collected data when working with quantitative data.
- SPSS, R, or, Python for more advanced data analysis, statistical analysis, and processing of volumes of data.

Conclusions

The most important principles of knowledge assessment of higher education seekers are thematic orientation, individual nature of knowledge assessment, demandingness, differentiation, objectivity, systematicity, and motivation. The module-rating system of training organization and training in "peer-to-peer" conditions, or peering training, is considered.

The content of peer assessment is recognized as an integral part of formative assessment and has a different focus than self-assessment.

The importance of the system of peering interaction using ICT and the advantages of peering education are shown. The basis of peering interaction is Web 3.0 technologies, the Internet, a large number of open educational resources (OER), and mass digitization of various materials. Peer 2 Peer University (P2PU) is an example of peering interaction and its successful functioning system. The possibilities for peer assessment are provided in the applications of research learning spaces.

Based on the results of the ascertainment experiment and the conclusions regarding the renewal and improvement of the educational sector, in general, and the evaluation of higher education applicants, in particular, a model of digital tools and methods of introducing peer evaluation into the educational process of higher education institutions was introduced into the educational process of higher education institutions. Based on the results of the implementation of such a developed model, we conclude that after the formative experiment in EG, the shares of respondents who are supporters of using traditional assessment (33.2%, dynamics – 8.9%) and prescriptive (16.7%, dynamics – 12.1%). The number of respondents who support digital tools and methods of implementing peer evaluation in the educational process of higher education institutions increased by 20.6%.

Further research will be directed to the consideration of the main positions of the implementation of peer evaluation in the educational process of higher education institutions.

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