ISSN 2077-6861 (online 2960-1649)

ABAI KAZAKH NATIONAL PEDAGOGICAL UNIVERSITY

Journal
“Pedagogy and Psychology”

Since september 2009

Volume 61 (2024): Issue 4 (December 2024)

ALMATY

Founder: Abai Kazakh National Pedagogical University, re-registered with the Ministry of Information and Public Development of the Republic of Kazakhstan on December 22, 2023, No. KZ22VPY00084314

Publication timeframe: 4 times per year. Editorial office address:
13 Dostyk Ave., 050010, Almaty, +7(727)2919182

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General information

The journal "Pedagogy and Psychology" of Abai Kazakh National Pedagogical University is a republican scientific and methodological edition. The journal was founded in 2009.

The main thematic focus of the journal "Pedagogy and Psychology" is the problems of the current state of all education levels.

Research, analytical, scientific and methodological articles reflecting the results of fundamental and applied research corresponding to the subject of the journal, as well as review articles with a clear indication of the conceptual position of the author(s) are accepted for publication.

Thematic directions of the journal:

- Innovations and problems of development of modern education
- Psychological and pedagogical problems of training specialists
- Current problems of inclusive and special education.

The mission of the journal is to attract scientists and educators to an open discussion of current problems of education, science; to support creative initiatives in the field of educational policy, theory and practice, to promote the integration of the activities of domestic and foreign scientists and teachers to improve the system of higher, secondary, general, additional and vocational education.

The target audience of the journal: the teaching staff of universities; academic staff and experts in the field of preschool, secondary, vocational and higher, postgraduate education; doctoral students, postgraduates, applicants, undergraduates and students of Kazakhstani and foreign universities and scientific and educational institutions, school teachers, teachers of additional education, etc.

The journal is included in the List of leading peer-reviewed scientific journals recommended for publishing the main scientific results of dissertations for getting degree and academic title by The Committee for Quality Assurance in the Field of Science and Higher Education.

The journal is included in the republican system of the Scientific citation index – the Kazakhstan Citation Database (KazCD).

The journal "Pedagogy and Psychology" was established by the Kazakh National Pedagogical University named after Abai (KazNPU named after Abai) and registered with the Ministry of Culture and Information of the Republic of Kazakhstan.

Date and number of initial registration: 06/24/2009 No. 10219-Ж.

The certificate of re-registration of the periodical No. KZ67VPY00033646 was issued on 19.03.2021 by the Information Committee of the Ministry of Information and Public Development of the Republic of Kazakhstan.

ID: ISSN 2077-6861 (online 2960-1649)

Terms of consideration of the received materials: 1-6 months.

The journal release schedule:

#1 – March;

#2 – June;

#3 – September;

#4 – December.

IRSTI 14.25.09 10.51889/2960-1649.2024.61.4.001

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DEVELOPMENT OF STUDENTS' SELF-LEARNING AND SELF-ASSESSMENT SKILLS USING CHECKLISTS

Abstract

The relevance of this research stems from the growing need to develop adaptable learners who can quickly respond to the changing demands of the modern educational environment. However, current scientific literature offers a limited focus on fostering student independence across various subjects, including biology. This gap drives the search for innovative approaches to teaching academic disciplines. This study aimed to assess the effectiveness of using checklists to enhance independent learning skills in biology lessons. Descriptive statistics and one-way analysis of variance (ANOVA) were applied to analyze the data. During the formative experiment, the first experimental group, which used both checklists and defined success criteria for the «Fundamentals of Cytology» unit, demonstrated the highest levels of self-directed learning, significantly outperforming the control group. ANOVA confirmed that the differences in academic achievement across the three experimental groups and one control group were statistically significant at a high level of confidence. Overall, the experiment confirms the pedagogical value of checklists in promoting independent learning and self-assessment in biology. The practical significance of this research lies in the successful testing and implementation of checklists and success criteria in a modern school setting, offering a potential strategy for enhancing biology education.

Keywords: learning strategies; biology course; learning skills; pedagogical technologies; quality of teaching.

Introduction. Modern society poses challenges to the education system associated with the formation of a mobile personality, capable of expressing self-sufficiency skills and successfully applying them in practice (Karlen et al., 2024). Therefore, following Bremner et al., (2022), the approach in which the student is the main priority of the educational process has become increasingly important. Du Toit-Brits (2021) notes that autonomy is one of the main learning skills in the 21st century. Artino and Ioannou (2008) refer to it as an indispensable quality of the modern education system. It is worth noting that several scholars in their research have covered the issues of organizing students' independent work (Basilotta-Gómez-Pablos et al., 2022; Darby, 2007; Boelens et al., 2017; Aizu et al., 2018; Bosch et al., 2019; Dewan et al., 2019; Sosibo, 2019; Robinson and Persky, 2020). The main emphasis in these works is on the effectiveness of learning material through the organization of self-learning. But still, some aspects of this problem remain understudied. For example, little attention has been devoted to the formation of students' self-learning and self-assessment skills in most school subjects, including biology.

The development of information technology and the popularity of online education have led to the fact that most educators understand the need to develop such skills in students (Çakiroğlu et al., 2024). Therefore, the study of these issues is extremely relevant, especially concerning biology. For many students, the study of modern biology has certain difficulties. This is due to a large number of complex concepts, the lack of creative tasks in the textbook, and, most importantly, the lack of real

self-assessment of the student. Bremner et al. (2022), Geng et al. (2019), and Sabanov (2019) agree that students should not only be allowed to learn independently but also do everything possible to make them take responsibility for their results. Often, the students do not understand what aspects they are missing in learning the material. Therefore, the research on self-assessment skills development peculiarities is of great importance. In the modern system of education, the teacher's role is to motivate students to independently find issues in learning and eliminate them (van der Linden et al., 2023). For this purpose, the teacher builds a learning path and allocates outlined criteria for success. They represent the milestones that need to be overcome by the student to learn the material effectively. If learning the school curriculum encounters obstacles along the way, it is easier for the student to recognize at what point they are having problems. To minimize the possibility of missing important information in the study of school subjects, and to promote the development of students' self-learning and self-assessment skills, checklist technology is being actively implemented (Alimova & Raimova, 2023; Budaychiyev et al., 2024).

Scriven (2000) defines a checklist as a list of certain main knowledge points, which are organized in a certain way to achieve the goals set. Under this technology, the student, following the items on the checklist, marks the actions already accomplished and sees the tasks to be accomplished. This is a convenient and entertaining form of work, which allows students to independently assess the correctness of the completed task and not stray from it. By marking items on the list, it is possible to determine at what stage of studying the material the student is. Wingate (2002) points out that checklists first appeared in aviation, where they ensured that pilots did not forget the take-off order, and landing, among other things. Later, they were transferred to other industries: medicine, catering, and others. In education, checklists were used to solve auxiliary problems unrelated to the study of material, for example, they helped the student pack a backpack or prepare for the report. Over time, this technology was used in teaching school subjects. As seen in the recent publications of Dos Santos (2019) and Dorji et al., (2021), there is still an unresolved issue on the pedagogical effectiveness of checklists, especially within the study of certain school subjects. The research aims to evaluate the suitability and pedagogical effectiveness of using checklists in a school biology course to develop students' independence skills.

Materials and Methods. The experiment was carried out based on the Nazarbayev Intellectual School of Chemistry and Biology in Kyzylorda, Republic of Kazakhstan. The study involved 200 students aged from 15 to 18 years (100 people of each gender). Three experimental and one control group (50 people in each group) were chosen to conduct the formative experiment.

In the first experimental group (EG-1) students used checklists and success criteria when independently studying the topics from the «Fundamentals of Cytology» section of the biology course. The checklists were compiled based on a generally accepted set of requirements (Scriven, 2000). Each checklist was a table consisting of educational tasks, and the student during self-learning had the opportunity to make a mark on the results of their solutions, assessing the level of their knowledge. Criteria of success were clear, and understandable and represented the results of learning (what the pupil had to strive for when mastering the material).

In the second experimental group (EG-2) only success criteria were used, and in the third group (EG-3) checklists were used. In the control group (CG), instruction was conducted traditionally without the use of checklists and success criteria. In all groups, the educational process was based on the same biology curriculum and was held at the same time. The same teachers were involved.

Descriptive statistics and one-factor analysis of variance methods were used for static data analysis. The results of the academic knowledge evaluation were processed using the standard software package «PASW Statistics 17». The normality of the distribution was evaluated

using the Kolmogorov-Smirnov criterion. In all cases studied, the variables had a normal distribution. After each self-study of the topics «Cell division» and «Application of enzymes in the industry», an assessment was conducted and three levels of academic knowledge of students were identified within each of the 4 experimental groups: low, medium, and high.

To assess the degree of the statistical reliability of the differences in the level of academic knowledge between the studied groups, one-factor analysis of variance was applied. The statistical method allows evaluation of the influence of the independent variable (use of checklists and/or success criteria) on the dependent variable under study (level of academic knowledge) by variance. In the literature and «PASW Statistics 17», analysis of variance is referred to as ANOVA/MANOVA (Analysis of Variance/Multivariate Analysis of Variance).

The null hypothesis (H_0) was formulated as follows: differences in academic proficiency between groups are distinct no more than random differences within each group. It is also worth noting that in this research the authors rejected the null hypothesis at $p<0.05$, thus allowing no more than a 5% chance of error.

Results. In recent years, teachers started to actively introduce technologies into the educational process aimed at developing students' self-learning skills. For example, checklists are used when studying school subjects more often. The key point of checklists is not to make a mistake in a given plan of action. That is, they directly reduce the likelihood of making mistakes «due to not knowing». Although elements of checklist technology have long been used in pedagogical activities in the form of action plans, memos, and instructions designed to study or consolidate the material, there is every reason to consider checklists an innovative technology in education. Mostly due to the requirements for the content of checklists (Scriven, 2000):

– the checklist should fully cover the topic being studied;

– evaluation criteria must be verifiable, reliable, and delineated;

– the items on the checklist should cover only one area of knowledge;

– the checklist should be short.

Checklists were developed to study the section «Fundamentals of Cytology» in the course of school biology. Tables 1 and 2 show examples of checklists for «Cell division» and «Application of enzymes in the industry».

Table 1. *Checklist for «Cell division»*

№	Question	Answer (✓/X)
1	Define meiosis as a method of cell division.	
2	Describe the meiosis phases.	
3	Specify the main differences between anaphase I and anaphase II of meiosis.	
4	Find the similarities between the phases of meiosis II and mitosis.	
5	Define the following terms: «homologous chromosome», «crossover», «sister chromatids», «bivalent/tetrad», «and alleles».	
6	Name the stage of meiosis in which «crossingover» occurs.	
7	Define meiosis.	
8	Compare meiosis and mitosis.	

Table 2. *Checklist for «Application of enzymes in the industry»*

№	Question	Answer (✓/X)
1	Name the main enzymes used in the production of detergents.	
2	Compare enzymes of plant and bacterial origin. State the possibilities of their use in medicine.	
3	Provide examples of the use of enzyme preparations in industrial large-tonnage processes.	
4	What are the main applications of lipases in the industry?	

5	What are the main problems with using ferments in medicine?
6	Provide examples of how enzymes function in our bodies.
7	Categorize beta-lactam antibiotics.
8	Provide examples of the use of enzymes in the food industry.
9	Name the main industries that use protease and amylase.
10	Define glucose isomerase and characterize its role in syrup production.
11	Define the role of lactase in milk production.
11	Name the enzyme used as the basis for the glucometer.

Tables 1 and 2 show that the checklists consist of three columns: the first column contains the number, and the second column contains the formulation of the task. The third column is for the mark, which the student puts as he or she learns the material, independently assessing their knowledge. It is especially important that students feel responsible for identifying and defining gaps in knowledge and forming learning goals following these gaps. The checklists contain a significant amount of specific knowledge. In other words, they represent data presented in the best possible way to achieve learning objectives. The use of checklists contributes to the improvement of the student's knowledge. The main goal of the experiment was to test the introduction of checklists in the self-study of the topics from the section «Fundamentals of Cytology». Their pedagogical effectiveness and suitability for the formation of students' independence skills were evaluated.

The checklists were offered to EG-1 and EG-3 during self-study of the educational material. Aside from the checklists, students in EG-1 were also provided with success criteria – statements allowing participants in the educational process to determine whether the learning goal was achieved. In EG-2 only success criteria were used. In addition, it is worth noting that the checklists were used after self-study of the material, and students were familiarized with the success criteria in advance. Tables 3 and 4 show the success criteria formulated for the topics «Cell division» and «Application of enzymes in the industry», respectively.

Table 3. *Success criteria for «Cell division»*

№	Criteria
1	I can describe and explain the phases of the cell life cycle and DNA (deoxyribonucleic acid) replication.
2	I can identify and describe the phases of mitosis on medical micrographs.
3	I can explain the characteristics of gamete formation in plants and animals.
4	I can identify the process of meiosis in plants on ready-made micro preparations.
5	I can explain the stages of meiosis.
6	I understand the process of tumour formation as the result of uncontrolled cell division.
7	I know the basic ways of dividing eukaryotic cells.

Table 4. *Success criteria for «Application of enzymes in the industry»*

№	Criteria
1	I know the classification of enzymes.
2	I can provide examples of how enzymes function in our bodies.
3	Provide examples of the use of enzymes in the food and cosmetics industry.
4	I can name the reactions catalysed by lipases, and I know the products that result.
5	I understand how the latest scientific advances in enzymology are applied in the treatment of cardiovascular, cancer, neurodegenerative, and other serious diseases.
6	I know the role of enzymes in chocolate production.
7	I can name at least 3 industries in which protease and amylase are actively used.

8	I understand the process of making high fructose syrups.
9	I understand how lactose-free milk is produced.
10	I know how a glucometer works.

The success criteria help the student to independently assess whether the goal set in mastering the material is achieved. During the formative experiment, the level of academic knowledge in the experimental and control groups after self-study of the topics from the school course biology was evaluated. The results of the control are shown in Figures 1 and 2. It was determined that the best results of self-study of the «Cell division» topic were noted in the experimental group of EG-1, where the percentage of students with a high level of knowledge was the highest – 40% (Figure 1). In comparison with the control group, this indicator is better by 30% (in CG it was 10%). Also, EG-1 recorded the smallest percentage of students with a low level of knowledge – 10% (compared to 25%, 18%, and 60% in EG-2, EG-3, and CG respectively). Figure 1 shows that the use of checklists in EG-3 led to higher academic proficiency scores than the use of success criteria alone in EG-2. In the first case, the percentage of students with a low level of knowledge was 18%, and in the second case, it was 25%. It is also worth noting that the highest percentage of students with an average level of knowledge was observed in EG-3 (60% compared to 50%, 55%, and 30% in EG-1, EG-2, and CG, respectively).

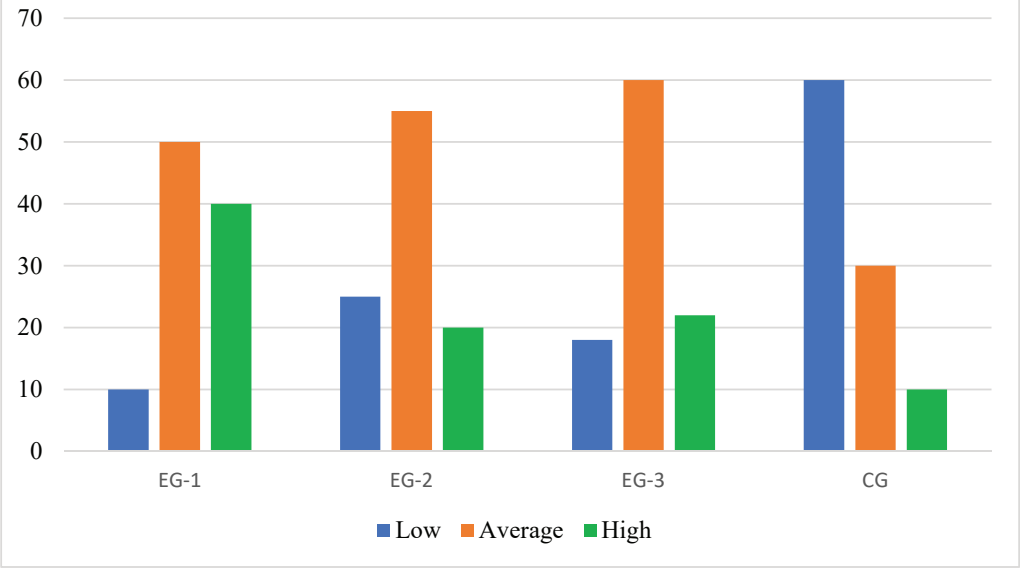

Figure 1: The level of academic knowledge in the experimental and control groups after self-study of the «Cell division» topic

Figure 2 demonstrates the level of students' knowledge after self-study of the «Application of enzymes in the industry» topic. The three experimental groups show a distinct difference in the level of academic knowledge, especially in comparison with the control group. A high level of knowledge in EG-1 had 45% of students, in EG-2 – 21%, in EG-3 – 26%, and in the control group, this indicator was the lowest – only 15%.

In the EG-3 experimental group, a higher level of academic knowledge was noted than in EG-2. A low level of knowledge was noted in 14% of students who used checklists during self-study of the «Application of enzymes in the industry» topic, which is 4% less than in students from EG-2 who used only success criteria for the same purpose. The lowest level of academic knowledge was noted in the CG group (Figure 2), where the biology studies were conducted with traditional conditions. As such, in the experimental groups where checklists and/or success criteria were introduced into the learning process during

self-study of topics from the school biology course, the student's level of knowledge was significantly higher than in the CG. To assess the degree of the statistical reliability of the differences in the level of academic knowledge between the studied groups, one-factor analysis of variance was applied to examine the influence of the independent variable (use of checklists or success criteria) on the dependent variable under study (level of academic knowledge).

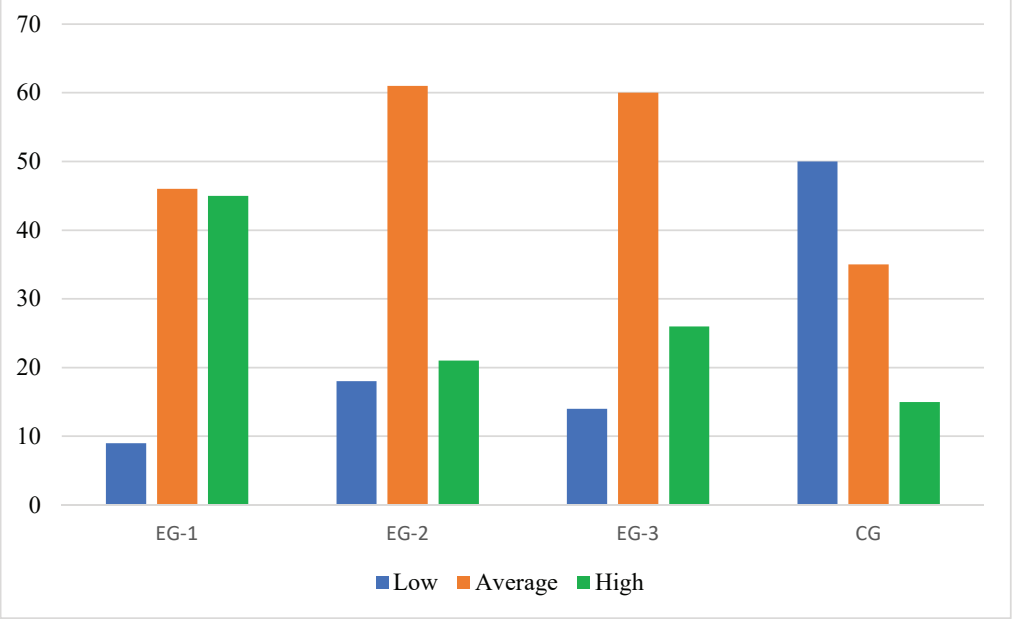

Figure 2: The level of knowledge in the experimental and control groups after self-study of the «Application of enzymes in the industry» topic

It is necessary to note that the popularity and usefulness of variance analysis as a popular technique for handling empirical data is caused by at least one significant reason. First, this analysis method allows the assessment of differences between average samples, similar to the student's test, but unlike it, in the variance analysis, there are no restrictions on the number of averages to be compared. This is especially relevant in this research since the results of self-learning in three experimental and one control group were analyzed. The null hypothesis H_0 was tested twice. In the first case, a significant difference in the level of knowledge of students from the experimental and control groups was verified after studying the «Cell division» topic, and in the second case, after studying the theme «Application of enzymes in the industry».

In the first case, $F_{emp} = 7.83$, and in the second case, $F_{emp} = 6.44$. For the significance level $p = 0.05$, F_{cr} was determined by the Fisher-Snedekor distribution table: $f_{cr} = 1.96$. In both cases, the empirical value of the criterion is greater than the critical value. Therefore, the differences in the level of academic knowledge between all experimental groups of students and the control group in the two studied cases are statistically reliable at a high level of significance. In other words, with a 95% probability, it can be stated that the use of checklists and/or success criteria for students' self-learning has a significant impact on their level of knowledge. The results confirmed the hypothesis that the introduction of checklists expedites the development of self-learning skills and self-assessment in students in biology classes. This is especially important since nowadays there are educational requirements to develop an independent personality capable of quickly adapting to the changing conditions of the world.

Discussion. Modern society demands schools to prepare individuals to adapt to rapidly changing conditions. Today, there is tension in the education system between the need to build up academic knowledge at a fast pace and the

limited opportunities for students to acquire it. This situation poses a need for educators to develop students' self-learning skills as much as possible. In such a case, there is a demand for pedagogical approaches where the focus of learning is not on the teacher but on the student, his or her dispositions, and interests. Approaches to student learning are inextricably linked to teaching methods and strategies. Recently, educators have been focusing specifically on learning strategies (Oxford, 2016; Bremner et al., 2022). Oxford (2016) categorizes strategies into three main groups:

– the first group relies on the mechanisms of human memory: the development of logical relationships, the use of visual, sound, and other components;

– the second group includes mental operations: comparison, inference, deductive and inductive analysis;

– compensatory strategies based on assumptions, synonyms, and more.

The use of checklists can be attributed to strategies based on human memory mechanisms. Scriven (2000) refers to checklists as a «mnemonic tool« since they minimize the likelihood of missing important knowledge milestones and making mistakes due to important information not being learned. The use of checklists in aviation resulted in a noticeable drop in the number of mistakes made by pilots due to their forgetfulness. Later checklists were successfully used in medicine, management, and other fields. As for education, checklists in the educational process were used by teachers in the study of certain disciplines. For example, the checklists proved themselves well in geography classes. They were used with geographical maps, including filling out contour maps, etc. In the school literature course, they were effective in teaching the analysis of a poem, an episode (Yarygina and Yarygin, 2019).

At the beginning of the research, a lack of data on the pedagogical effectiveness of checklists in biology classes was present. The issue of their usefulness for the formation of students' self-learning and self-assessment skills remained unclear. For many of today's students, the biology course is considered difficult due to its complex and extensive conceptual apparatus. In addition, students often misunderstand what they have learned well and what they do not know. This problem can be solved through the organization of pedagogical activities aimed at the development of these skills in the teaching of biology. The main feature of students' self-learning is the awareness of each action that the student performs in the course of achieving the educational task. The checklists allow students to independently assess their acquired knowledge by marking items from the list of educational tasks. In the developed checklist, there was a column, that pupils filled in as they learned the material. At the same time, they acquired knowledge of their initiative and were interested in it. The use of checklists constantly reminded the students of their work, prevented distractions, and forced them to move forward in mastering the educational material.

It is worth noting that self-learning strives for more natural forms than traditional learning. However, much depends on several facts: the socio-demographic characteristics of the student, the peculiarities of their information consumption, among other things (Loeng, 2020). Educators are seeing the trend, in which traditional learning is no longer as effective, which means that some aspects of it need to be reconsidered. Learners should be able to self-regulate their cognition, motivation, and behavior. To develop the necessary skills, it is necessary not only to give the student autonomy in learning but also to do everything possible for the student to take responsibility for the results obtained. This is facilitated not only by the checklists but also by the success criteria developed for the two topics from the section «Fundamentals of Cytology» during school biology. The student's ability to self-assess depends on the success of their learning.

In the EG-3 experimental group, where only checklists were introduced in the learning process, the highest percentage of students with an average level of knowledge was noted. In the same group, the knowledge level indicators were higher than in EG-2 and CG. Thus, the use of checklists provided better learning outcomes

than the use of only success criteria and teaching in traditional settings. This can be explained by the fact that when using checklists, unlike success criteria, a student has an opportunity to mark items on the list and see the progress of learning the material, thereby avoiding making mistakes. Although success criteria showed greater pedagogical effectiveness compared to the traditional system of teaching in the control group, where the highest percentage of students who did not learn the material was noted. The best results of independent learning were noted in the EG-1 experimental group where not only checklists but also success criteria were involved in the educational process.

The research results indicate that the checklists and success criteria contribute to the development of students' independence skills and have a positive impact on the level of their knowledge. It can be assumed that this is due to the motivation of students to find problem areas in learning and solve them. Indeed, researchers have noted that one of the most important components of self-learning is motivation, which is the desire to engage in a particular activity and achieve goals (Morris, 2019; Boelens et al., 2017). A student will act independently if they believe that the activity contributes to an outcome that is important to them. Additionally, if motivation is not present, the learner will not have control over the learning process and will not achieve the learning goals. Artino and Ioannou (2008) articulate that when students' internal motivation is addressed, they are freed from the need to receive positive external cues and can focus on their needs rather than the opinions of others.

The use of modern pedagogical technologies increases students' motivation to learn and has a significant impact on the level of their knowledge. Using a single-factor variance analysis, the differences in the level of academic knowledge between all three experimental groups and one control group were found to be statistically reliable at a high level of significance. In other words, the use of checklists and/or success criteria for independent learning of topics from the school biology course has a significant impact on the level of student knowledge. The results show that the introduction of checklists promotes the development of student's independent learning skills and self-assessment in biology classes.

Conclusions. The use of checklists in biology lessons contributes to the development of students' self-learning skills and self-assessment. In all three experimental groups, the level of knowledge differed for the better in comparison with the control group. Although the use of checklists provided better learning results than the use of success criteria alone. The best results of self-learning were noted in the EG-1 experimental group, where checklists and success criteria were involved. It can be assumed that this is because to develop the necessary skills pupils need to be motivated to find problem areas in learning and to solve them. This is facilitated not only using checklists but also by the success criteria which allow the student to independently assess whether the goal set for them in mastering the material has been achieved.

The conducted research allows us to state with a 95% probability that the application of checklists and/or success criteria in the educational process has a significant impact on the level of student's knowledge. Thus, checklists are a suitable and effective tool for shaping students' self-learning and self-assessment skills. Therefore, the developed checklists and success criteria can be successfully applied when studying the section «Fundamentals of Cytology». The issue of forming students' independence skills is complex and diverse, especially within the study of school biology courses, a discipline with a complex and extensive conceptual apparatus. The conducted research creates prerequisites for a more comprehensive study of this issue. The main prospects for further research are related to the introduction of other teaching strategies to develop students' independence skills in biology classes. Also, the issues of the effective study of school disciplines in a distance learning environment, which has recently become more and more topical and popular, require more detailed consideration.

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IRSTI 14.35.07 10.51889/2960-1649.2024.61.4.002

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THE CONCEPT OF DESIGNING A «SMART CLASSROOM» OF AN EDUCATIONAL INSTITUTION

Abstract

The creation of a smart classroom is one of the priorities of the digital transformation of higher education, which allows for an increase in the efficiency of the educational process creates comfortable conditions for learning using the latest technologies, and is carried out in several stages. Concept development is one of the first and most important steps in creating a smart classroom. It defines the main directions and goals of creation, the structure and content components of a smart classroom, and the requirements for its functionality to create the most efficient and convenient space. The purpose of this study was to develop a concept for designing a smart classroom for the training of future informatics teachers and ICT specialists for education, the further implementation of which will not only optimize resource management but also create more effective, comfortable, and modern conditions for learning. The research methodology included analysing literature on the creation and implementation of smart classrooms in the educational process, as well as surveying its potential users to determine the functionality requirements. Based on the analysis of literature and the survey results among informatics students and future ICT education specialists, the functionality for the «smart classroom» was constructed, and its key structural components for implementation were identified and substantiated. The developed concept defines the technological basis for creating a functional smart classroom that meets modern requirements.

Keywords: smart classroom, equipment management automation, control sensors, system integration, Likert scale, sensor equipment.

Introduction. The creation of a smart classroom is one of the priorities for the modernization of the educational process in universities in modern conditions of rapid development of intelligent technologies. The Smart Classroom, based on the Internet of Things concept, represents a high-tech learning space where all technical systems and devices work in coordination with minimal or no human intervention, ensuring maximum comfort and effectiveness of the educational process (Yağanoğlu et al., 2024).

Such classrooms contribute to the development of innovative approaches to learning and education, providing new opportunities for interactive learning, the use of virtual and augmented reality, video classes, and other innovative educational formats (Ma et al.,

2024). A comfortable, stimulating, intelligent atmosphere in the classroom, created by smart equipment integrated into a single network, meets the needs of modern students who are accustomed to digital devices and online resources. Smart classrooms provide the opportunity to use these technologies in the educational process, increasing their engagement, efficiency, and quality of learning to the requirements of the digital age (Hu et al., 2022; Lu et al., 2021).

Automation of routine tasks in a classroom with the help of «smart» technologies helps to optimize the educational process and allows teachers to focus on the creative aspects of learning and improve the quality of the educational process (Pospelova et al., 2024). Creating smart classrooms to improve the learning environment by modern technological challenges, makes the university more modern, and contributes to increasing its attractiveness and competitiveness.

Due to their relevance, a lot of research has been devoted to the creation and implementation of a smart classroom in higher education institutions. In the work of Grigoriev et al., (2013), the principles of the organization and functioning of the smart classroom are formulated, in the study of Kostarev et al., (2020). Kostarev et al., (2020) present the concept of creating and physically implementing a smart classroom. In the work of Shen et al., (2014) the possibility of using short-range wireless communication technology to automate attendance management, determine the location of students, provide real-time feedback, and increase their motivation to study informatics. Among other works, important technical characteristics of various types of smart classrooms are considered, which are usually equipped with interactive whiteboards and touchscreens, wireless displays and shared screens, cameras and recording and broadcasting equipment supporting synchronous and asynchronous video transmission, setting up the Internet of Things to control the microclimate in classrooms (Saini & Goel 2019; Radosavljevic et al., 2022). In the work of Suo et al., (2008) a synchronous distance learning system open smart classroom is proposed to solve the problems of remote software management, downloading files, and adding new remote classes (including mobile devices) to synchronous live courses.

A lot of research has been devoted to the impact of smart classrooms on student academic performance and effectiveness in higher education (Yang & Huang 2015; Phoong et al., 2019; Radosavljevic et al., 2022; Asalkhanov & Petrova 2021). All these works formed the basis of our research.

Technically, the smart classroom is very similar to the smart home and includes the same modules for microclimate, lighting, security, switching on and off equipment, and others. Such modules have already been technically implemented in a smart home, and the idea of solving them can also be applied when creating a smart classroom. The difference between a smart classroom is that it is an educational room equipped with computer technology and specialized equipment, and the necessary educational effect will be achieved if a comfortable intellectual learning environment is created (Barinov, 2023). Learning in such an educational environment equipped with various IoT technologies combined into a single network prepares future informatics teachers and specialists in the field of ICT application in education to work in a high-tech world and prepare the younger generation for this.

At the moment, there are very few analogue of its creation and application in the educational process, they mainly solve narrow tasks related to the development of the IT infrastructure of the classroom based on IoT. The purpose of this study was to develop a concept for designing a smart classroom, the further implementation of which will not only optimize resource management but also create more effective, comfortable, and modern-day learning conditions.

Materials and methods. The research was conducted in three stages: theoretical, experimental, and analytical. The choice of research methods at each stage was determined by the goals and objectives of the study. The study and analysis of the literature on the topic under consideration, the practice of creating

and introducing a smart classroom into the educational process at the first stage allowed us to conclude the need to create a smart classroom and introduce it into the system of training future informatics teachers and ICT specialists for education, which will provide them with the necessary knowledge and skills for successful work in a modern school in the rapidly changing world of information technology.

The survey of students and teachers of informatics, future specialists in the field of ICT for education at the second stage of the study allowed us to determine the requirements for its functionality to create the most efficient and convenient space.

The survey was attended by students of 1-4 courses of the specialties Informatics, Informatics and Robotics, Information Systems in Education and teachers of the Department of Informatics and Informatization of Education of the Abai Kazakh National Pedagogical University and teachers of several schools in Almaty.

Statistical methods were used to process, analyse, and interpret the survey results at the final stage. The analysis of the results of the conducted research made it possible to determine the conceptual scheme of the «smart classroom» system, its necessary hardware and software components, and intelligent control schemes for various classroom systems.

Results and discussion. The preparation of future informatics teachers and ICT education specialists requires constant adaptation to the rapidly changing technological landscape. Traditional classrooms, equipped only with an interactive whiteboard, no longer fully meet the needs of the modern educational process. Given the rapid development of technologies, it is advisable to train them in a smart classroom equipped with innovative IoT-based equipment that meets modern technological challenges. Such a classroom will enable students to acquire the modern knowledge and skills necessary for successful work in the rapidly changing world of information technology.

A smart classroom is not just a learning space equipped with smart equipment. It is an integrated system in which all elements, from the interactive whiteboard to the ventilation system, are interconnected and centrally controlled. Its creation includes several stages:

– analysis of needs and definition of functional requirements for a smart classroom based on the specifics of academic disciplines and user needs;

– designing a concept describing the specific goals of creating a «smart classroom», its intended functionality, and the technologies, equipment, and software necessary for its implementation;

– installation and configuration of hardware and software;

– training teachers and technical staff to use smart hardware and new software;

– step-by-step implementation of the smart classroom in the educational process, monitoring the operation of the system, and making necessary adjustments.

The foundational stage in the process of its creation is the development of a concept for designing a smart classroom. This is the foundation on which the entire smart classroom system is built. To determine the need to create a smart classroom for the training of future specialists in the field of IoT, its potential advantages over traditional classrooms, and the requirements for its functionality, the present research studied and analysed the work of scientists and the results of implemented practices in this field (Asalkhanov & Petrova 2021; Palau & Mogas 2019; García-Tudela et al., 2023; Phoong et al., 2019; Dai et al., 2023), and a survey was conducted among 216 respondents (students of the specialty Informatics, Informatics and robotics and Information systems in education, as well as teaching staff of pedagogical universities in Almaty).

To determine the priority functions of the smart classroom for potential users and, accordingly, the requirements for the functionality of the smart classroom, they were asked 10 questions (table 1) covering key aspects of the functionality of the smart classroom using the Likert scale to assess the degree of agreement or disagreement of respondents with various statements. This will optimize the functionality of the system during creation and make it more convenient and efficient.

Table 1. *Questions on the definition of key aspects of the functionality of the «smart classroom» and the results of the survey on them*

		no	I don't know	yes
1	A smart classroom should be flexible and easily adaptable to different work formats	30 (14%)	7 (3%)	179 (83%)
2	The presence of automatic lighting and temperature control systems in the classroom improves comfort and increases productivity	4 (2%)	22 (10%)	190 (88%)
3	The presence of interactive elements (for example, touch panels, touch tables, interactive scoreboards) will make lessons more interesting and effective	10 (4.5%)	12 (5.5%)	194 (90%)
4	The presence of voice control systems significantly increases the efficiency of the educational process	2 (1%)	15 (7%)	199 (92%)
5	The integration of the smart classroom system with the university's learning platform will optimize the learning process.	-	54 (25%)	162 (75%)
6	Integrating a classroom management system with popular video conferencing platforms is a must for a smart classroom	22 (10%)	43 (20%)	151 (70%)
7	The function of recording lectures and automatically saving them to the cloud storage will be useful for students	17 (8%)	130 (60%)	69 (32%)
8	Do you consider it necessary to implement wireless presentation in a smart classroom to simplify the reporting process?	26 (12%)	17 (8%)	173 (80%)
9	The availability of automatic attendance control systems is a prerequisite for a smart classroom	22 (10%)	17 (8%)	177 (82%)
10	A smart classroom should automatically connect to a personal calendar and adjust classroom settings according to planned events.	4 (2%)	52 (24%)	160 (74%)

In this questionnaire, the Likert scale 3 was used (1-no, 2-I don't know, 3 – yes). Teachers and students evaluated it according to their real ideas. The school was then tested to verify its validity and reliability. The results showed that Cronbach's alpha (α) is 0.9047 and the square root of α, which was used to determine validity, is 0.951. Smits et al., (2018), indicate that the reliability and validity values are excellent, as indicated in the work of Heale & Twycross (2015) and even indicate a very high internal consistency of the data.

The survey results provided a more complete understanding of the needs and expectations of various user groups and highlighted the main requirements for its functionality:

– combining, various technical devices (with sensors of illumination, temperature, motion, and others) used in the smart home, computers, interactive panels, audio and video systems, touch tables, and other equipment of the classroom into a single system for ease of management;

– integration of the above-mentioned technical devices and equipment of the classroom with other information systems of the university and popular educational platforms (LMS, Microsoft Teams, and others) to optimize the educational process;

– integration of interactive equipment (interactive panels, surveys, tests, and other classroom tools) into a single system to involve students in the learning process and ensure active interaction of subjects of the educational process with each other;

– automation of routine processes specific to the classroom: automatic monitoring of student attendance, automatic task verification, and automatic control of technical equipment (just like in a smart home);

– personalization of learning: adaptation of educational materials and teaching methods to the individual needs of each student;

– automation of recording and storing lectures to view them again and create a knowledge base;

– automation of the processes of collecting and analysing data on attendance, class effectiveness, and student preferences to optimize the learning process;

– user-friendliness: a simple and intuitive interface for managing all audience systems.

The listed requirements are general and can be adapted to the specific conditions and needs of the university and, if necessary, supplemented. Taking into account these requirements and based on the analysis of research in this field (García-Tudela et al., 2023; Li et al., 2015; Palau & Mogas 2019; Dai et al., 2023), the structural components of the smart classroom have been identified, which can be divided into several categories. They are presented differently by different authors (Li et al., 2015; Palau & Mogas 2019; Dai et al., 2023). In this article, as well as in the work (Dai et al., 2023), 3 structural components are considered: the physical environment, resource space, and social space.

The physical environment is an important component of a smart classroom. It covers all the physical objects of the learning environment that can affect learning and the organization of the learning process, including infrastructure, educational equipment, and systems, as well as sensory equipment, which is the basic support for the entire classroom. The infrastructure of the classroom mainly includes the spatial layout of the physical environment: dynamically combined tables and chairs, controlled lighting, blinds, air conditioning fresh air supply, and others.

Educational equipment and control systems are used primarily for the presentation of educational content, communication and collaboration, and knowledge transfer and include intelligent display equipment, an intelligent terminal, augmented reality (AR)/virtual reality (VR) equipment, audio and video equipment, network equipment, recording and broadcast equipment, and a centralized Internet of Things management system. Sensor equipment is the main channel for receiving data in a «smart classroom», including a high-definition (HD) camera, face recognition cameras, temperature and humidity sensors, illumination, motion, a microphone, a universal card reader, and others. It recognizes, identifies, and collects the necessary data in the classroom using various sensors. The collected data includes information about the surrounding state in the classroom, data about the learning process, and information about personality recognition, among other things.

The physical environment of the «smart classroom» for effective IoT training includes the following devices and control systems:

– interactive panel for presentations of educational material and results of educational and scientific research in 3D format and collaboration;

− the teacher's desktop, equipped with a computer, a video conferencing system for managing the presentation and activities of students, and remote interaction with them, an electronic attendance log, a system for viewing and managing the content of students;

− high-quality video cameras and audio systems to ensure a clear display of three-dimensional visual aids and sound;

− wireless networks for Internet access and data exchange;

− computers for students, integrated into a single network, connected to the teacher's computer and an interactive panel;

− smart interactive scoreboard;

− touch tables for organizing student collaboration;

− 3D printer for prototyping devices and models;

− demonstration prototypes (smart traffic light, smart greenhouse, smart home, robotics kits, and others) used in the training of future IoT specialists for education;

− microclimate control system, including air conditioning, temperature, humidity, carbon dioxide concentration sensors, a subsystem of window opening drives for automatic maintenance of indoor air quality;

− the control system for natural (curtains) and artificial lighting (lamps) to automatically maintain the lighting level recommended by sanitary standards in the auditorium;

− the automation system of equipment management implies the installation of «smart» sockets that will allow remotely, at a certain time or according to a given scenario, to turn on (turn off) equipment, for example, when a teacher enters the classroom, it is possible to use voice control;

− automation system for opening and closing window blinds;

− equipment technical condition monitoring system;

− SMS notification system for critical situations;

− the student face recognition system at the entrance to the classroom to provide automated monitoring of class attendance;

− the classroom access control system. The smart classroom security system involves the installation of a video surveillance system (IP camera with built-in motion sensor) with the storage of observation data in a cloud service, door and window opening sensors, and vibration sensors for expensive machinery and equipment.

− voice control systems for equipment and information retrieval without using a keyboard and mouse;

− systems for automatic task verification, and chatbots for answering questions.

To manage all the components of the system and their interaction with each other and the user, it is necessary to connect the devices to a single node, the server. For these purposes, you can use a microcomputer (for example, Odroid or Raspberry Pi) and special open-source software (for example, Home Assistant or Yandex Smart Home). To control the system of classroom elements in manual mode, it is possible to install a smart tablet with the development of click scenarios. Such an integrated smart classroom management system will allow centralized control through the touch panel interface of the entire complex of smart classroom equipment, even by an unprepared user.

Currently, in all educational institutions, many classrooms are standardly equipped with interactive panels that are controlled from the teacher's computer. Thanks to them, it becomes possible.

– demonstration of educational material to illustrate the studied concepts and practical situations;

– the use of various digital educational resources and presentations, the ability to supplement and save existing records; at the same time, there is no need to stand near the blackboard to make any notes or corrections, since he controls the blackboard from a computer.

Students' computers, touch desks, 3D printers, and other devices can also be connected to the specified interactive panel system, the teacher's computer. This integration of technical means into a single network is one of the components of a smart classroom. In such a learning environment, the learning material is available not only on the teacher's computer screen and is demonstrated on a smart board, but is also shown in parallel on each student's computer. The teacher can transfer control to any of the students both on the blackboard and on the computer screens of the teacher and all students, he will be able to demonstrate his solution from the spot, which will allow the teacher to assess the correctness of the execution, and the group to see a solution to the problem, ask questions (Kostarev et al., 2020).

The creation of such a learning environment, where the teacher's computer, interactive panel, students' computers, and other technical learning tools work as a single whole, centrally controlled, will allow for the implementation of a student-centred, activity-based approach to learning, optimize the learning process, increase its efficiency and interactivity. To create such an environment, in addition to physically connecting technical training tools to a single network using cables or Wi-Fi.

− routing configuration is required to ensure communication between devices;

− the necessary software is installed for the devices to interact with each other and with the interactive panel. The ability to display the smart panel screen on students' computers is being configured;

− data synchronization between devices is configured;

− device management software is being installed. The possibility of remote control of all network devices is implemented;

− a reliable server or cloud solution is being identified that will centralize network management. It will store all settings, software, educational materials, student and teacher data;

– scripts are created to automate various tasks, for example, turning on/off devices, and launching applications.

Of course, equipping a «smart classroom» and the competent organization of management of all its systems plays a key role in creating an intellectual learning environment and improving the effectiveness of the educational process. The elements included in the physical space can support the representation of various resources necessary for the organization of the educational process and provide a place for their storage and management. As a medium of communication, the physical environment also provides support for the social space of the smart classroom. Therefore, the physical environment is one of the important components of a smart classroom that should be taken into account when designing it.

An equally important component of a smart classroom is the resource space. Resources, physical and informational, are the main elements of the introduction of intelligent learning in a smart classroom. In this case, it is possible to use various LMS and educational platforms (Microsoft Teams) with the integration of cloud services. They provide various learning management services, such as user management, and digital educational content, provide rich information resources for organizing intellectual learning activities, both in a smart classroom and beyond, allow online and offline connections, and organize mixed learning. Their use in the learning process allows teachers to instantly adjust learning strategies and display resource content according to the learning situation to fully reflect the student-centred learning concept.

Learning through the combination of a variety of physical and digital resources included in the resource space of a smart classroom is an important feature of the intellectual learning environment. The choice of specific software products included in the resource space of a smart classroom depends on the needs of the educational institution and the characteristics of the equipment. The most accessible of them are:

– cloud services such as Google Classroom, and Microsoft Teams provide tools for placing educational material and organizing both individual and collaborative work of students, as well as for instant organization of video conferences and classes not only offline but also in a mixed format and the implementation of the inverted classroom model;

– platforms for conducting online surveys, tests, and other interactive activities;

– learning management Systems (LMS) for the organization of the learning process;

– virtual laboratories (Tinkercad, and others);

– video conferencing software;

– open platforms such as OpenCast, and Canva, among others, for recording and storing lectures. Canva also provides a set of tools for creating artificial intelligence-based content and performing group projects.

Smart classroom software plays a key role in creating a comfortable, stimulating, innovative, and interactive learning environment. It allows you to combine various devices and systems (interactive panels, computers, sensors, and others) into a single whole, providing convenient management and optimization of the educational process, and allowing teachers and students to interact with educational material at a new level. By mining the collected data, the resource space can provide resources and data to groups of users of the social space. At the same time, it also acts as a link between social relationships, that is, by taking resources as a link to form a community of people with the same or similar learning needs and interests, to encourage team learning.

The social space of the «smart classroom», as its third important structural component, mainly includes the space of students, the teacher's space, and the administrative space and ensures their interaction through the resources and systems of the «smart classroom» communication in the format of questions and answers, monitoring of educational achievements of students, instant communication tools and more. Offline interaction refers to interaction in the classroom, including group discussion, supported by information technology integrated into a single system, and real-time feedback. Online interaction is mainly carried out through the support service platform. For example,

students can visit the course homepage to complete assignments and tests published by teachers, receive feedback on the work done, and communicate and interact on topics of interest in the course in the discussion area.

The smart classroom can be managed from a shared server or devices connected to it. Compliance with the principles of organization and functioning of the «smart classroom» formulated in the work (Grigoriev et al., 2013) (heterogeneity, object orientation, cross-platform, meaningful and methodological unification) minimizes almost all technical and technological problems of integration and unification of various engineering and informatization tools within the framework of the «smart classroom».

Conclusion. Smart classroom is not just a trend, but a necessary condition for modern education. It allows you to make the learning process more efficient, convenient, and interesting for both teachers and students and helps to increase the attractiveness of the university. The use of this innovation in IoT training for future informatics teachers and specialists in the field of information and communication technologies in education will improve the quality of their training in this field. The presented concept defines the technological basis for creating a functional smart classroom of an educational institution that meets modern requirements. It allows you to clearly define the necessary set of technologies and tools to equip the classroom with intelligent innovative systems. Due to the dynamic development of artificial intelligence and Internet of Things technologies, it is possible to expand the functionality of the smart classroom and subsequently modernize this concept taking into account new technologies.

Acknowledgements. This research article has been supported by the Ministry of Higher Education and science of the Republic of Kazakhstan within the project «IoT Transformation of an Educational Institution: Design, Implementation of Smart Classrooms and Training of Specialists in the Field of IoT for Education» (IRN AP23490844).

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IRSTI 14.25.09 10.51889/2960-1649.2024.61.4.003

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GRAMMARLY'S INFLUENCE ON ACADEMIC WRITING CONFIDENCE IN HIGH SCHOOL STUDENTS: A QUASI-EXPERIMENTAL STUDY

Abstract

This quasi-experimental study investigates the impact of Grammarly, an AI-powered writing assistant, on the confidence and self-efficacy of high school students in academic writing. Conducted with 48 students from a school of Physics and Mathematics, the research employed a non-randomized design with two groups: an Experimental Group using Grammarly Premium and a Control Group that did not receive technological support. Results indicated that Grammarly significantly reduced writing errors in the EG, compared to a lesser reduction in the CG. Additionally, the EG reported notable improvements in writing confidence and self-efficacy, with increases observed on validated scales. These findings suggest that Grammarly can substantially enhance both the quality of academic writing and students' self-perceptions as writers. The study highlights the potential of integrating digital tools in educational settings to foster better learning outcomes. Limitations include the study's short duration and non-randomized group assignment, pointing to the need for further research to explore long-term effects and broader educational impacts.

Keywords: Grammarly; academic writing; high school students; self-efficacy; confidence; educational technology; writing skills improvement.

Introduction. Academic writing proficiency is a crucial skill for high school students, serving as a foundation for success in higher education and professional endeavors. However, many students struggle with grammatical errors and structural inconsistencies, which can undermine their confidence and self-efficacy in writing tasks. In recent years, technological tools such as Grammarly have gained popularity as aids for improving writing quality by providing real-time feedback on grammar, punctuation, and style (Kretinina et al., 2023).

In Kazakhstan, there has been increasing interest in incorporating digital technologies into educational practices to improve learning outcomes (Kaukenbay, 2024). However, little research has been conducted to assess the specific impact of Grammarly on high school students' academic writing in this context. This study seeks to address this gap by investigating the influence of Grammarly on the confidence and self-efficacy of high school students enrolled in the Global Perspectives and Project Works (GPPW) course at the Nazarbayev Intellectual School of Physics and Mathematics in Almaty. The GPPW course requires students to engage in various research-based writing tasks, making it an ideal setting to evaluate the effects of AI-powered writing assistance on academic performance and students' self-perception as writers.

Grammarly is an AI-powered writing assistant designed to enhance the clarity, coherence, and correctness of written text (Grammarly, 2017). By analyzing text for grammatical errors, spelling mistakes, and stylistic inconsistencies, Grammarly provides users with suggestions for improvement, thereby potentially reducing common pitfalls in academic writing. Research indicates that the use of grammar correction tools like Grammarly can lead to improvements in writing quality and accuracy (Vocabulary. com, 2020).

Studies have suggested that the integration of technology into writing instruction can positively impact students' attitudes and self-perceptions as writers (Fokides & Peristeraki 2024). For instance, Kim and Han (2020) found that the use of grammar correction software in an ESL writing course contributed to increased learner autonomy and confidence in writing tasks. Similarly, Ching et al., (2019) reported that students perceived grammar checkers as valuable tools for self-improvement in writing, leading to enhanced self-efficacy in academic contexts.

Several research initiatives have examined Grammarly's effect on writing skills. Findings from these studies indicate that Grammarly not only aids in enhancing students' grasp of grammatical principles but also bolsters their confidence in composing text. Additionally, investigations have shown that Grammarly significantly enhances the quality of students' written work, fosters greater precision in writing, and positively influences their attitude toward Computer Assisted Language Learning and acquiring English writing skills (Fadhilah et al., 2019; Ghufron & Rosyida 2019). Further evidence from research suggests that Grammarly stimulates students' interest in writing, promotes autonomous learning, and generates enthusiasm for revising their work, thus minimizing errors in grammar, punctuation, spelling, sentence structure, stylistic choices, and vocabulary development (Ghufron & Rosyida, 2018; Yulianti, 2018).

Confidence and self-efficacy play great roles in shaping students' writing behaviors and outcomes. Bandura (1997) defines self-efficacy as the belief in one's capability to successfully execute tasks and achieve desired outcomes. In the context of academic writing, self-efficacy influences students' persistence, effort, and performance (Pajares, 2003). Students with high levels of self-efficacy are more likely to engage in writing tasks, seek out challenging assignments, and persist in the face of obstacles (Zimmerman, 2000). Confidence in writing abilities is closely linked to self-esteem and academic achievement. Students who perceive themselves as competent writers are more likely to approach writing tasks with enthusiasm and perseverance, leading to higher-quality outcomes (Patrick et al., 2018; Ryba et al., 2021). Conversely, students with low confidence may experience anxiety, reluctance, and avoidance behaviors

in writing contexts, hindering their academic progress and inhibiting their growth potential (Vandamme et al., 2019).

The Social Cognitive Theory (Bandura, 1986) provides a theoretical lens through which to understand the relationship between Grammarly support, confidence, and self-efficacy in academic writing. According to this framework, individuals' beliefs about their capabilities (self-efficacy) are influenced by personal experiences, social persuasion, and vicarious learning. By providing students with immediate feedback and corrective guidance, Grammarly may enhance their writing skills and bolster their confidence in their ability to produce coherent and error-free texts. The Theory of Self-Regulated Learning (Zimmerman, 2000) posits that students actively monitor, regulate, and adapt their learning behaviors to achieve academic goals. The use of Grammarly as a self-regulatory tool may empower students to take ownership of their writing process, identify areas for improvement, and implement strategies to enhance their writing proficiency. Through repeated practice and feedback, students may develop a sense of mastery and competence in academic writing tasks, thereby strengthening their self-efficacy beliefs (Ramadan Elbaioumi Shaddad & Jember, 2024; AL Harrasi, 2023).

Materials and Methods. The study was conducted as part of the Global Perspectives and Project Works (GPPW) course, a subject aimed at developing critical thinking, research skills, and the ability to articulate ideas through academic writing. In this course, students are required to engage in various writing tasks, research projects, and presentations, making it an ideal context to examine the influence of Grammarly on academic writing confidence and self-efficacy. The students, all in Grade 11 (aged 17-18 years), being educated at NIS (Nazarbayev Intellectual School) of Physics and Mathematics in Almaty were tasked with producing extended written assignments, which demanded a high level of grammatical accuracy, clarity, and coherence key elements that would benefit from the support of an AI-powered writing assistant like Grammarly.

The authors employed a non-randomized, quasi-experimental design with two groups:

Experimental Group (EG): This group consisted of 24 high school students. The students were introduced to Grammarly Premium on the first day of the intervention and received a brief tutorial on how to utilize its various features. These students were given full access to Grammarly Premium for two weeks, during which they were encouraged to use the platform's features, including real-time grammar and style suggestions, plagiarism detection, and vocabulary enhancement tools. Students in this group used Grammarly while completing various academic writing tasks assigned as part of their GPPW curriculum, such as essays, research papers, and project reports. Although Grammarly's use was not mandatory, students were incentivized to actively engage with the tool, and their usage was monitored to ensure consistent exposure to its features.

Control Group (CG): This group also comprised 24 high school students. They participated in the regular curriculum instruction in academic writing skills but did not receive access to Grammarly or any other additional writing support tool. These students followed the standard curriculum for academic writing in the GPPW subject but did not have access to Grammarly or any other supplementary writing tools during the intervention period. Like the EG, they completed the same writing tasks but relied solely on teacher feedback and peer review for corrections and improvements.

The choice of a quasi-experimental design without randomization was due to logistical constraints within the school setting. Nonetheless, this approach allowed for a meaningful comparison between the groups, while controlling for confounding variables such as teacher instruction and academic writing topics.

Both groups were administered the pre-intervention survey at the start of the study and the post-intervention survey at the end of the two weeks. The surveys were designed to measure any changes in students' confidence

and self-efficacy in academic writing, with particular attention paid to whether Grammarly had a measurable impact on these outcomes in the EG compared to the CG.

Confidence in academic writing was assessed using a 7-point Likert scale, with higher scores indicating greater confidence. Self-efficacy in academic writing was measured using a validated scale and a range of questions considering several levels of self-efficacy (Bandura, 2006).

Results. This study employed primary data, meaning the information was collected directly from the participants (Glen, 2022). The data consisted of two parts:

Quantitative data, where error types and their frequencies were obtained by analyzing participants' writing assignments before and after revision using Grammarly Premium. Minor adaptations were made to error classifications.

Qualitative data, where to gather participants' opinions and experiences, this study applied a survey that consisted of questions exploring participants' behavioral, cognitive, and emotional engagement with writing, as well as their writing self-confidence related to feedback received, affective filters, and indicators of confidence.

Preliminary analysis revealed no significant differences in baseline confidence and self-efficacy scores between the experimental and control groups ($p > 0.03$). However, post-intervention analysis showed a significant increase in confidence ($t = 2.14$, $p < 0.002$) and self-efficacy ($t = 2.09$, $p < 0.001$) scores in the experimental group compared to the control group.

The experimental group (EG), which used Grammarly Premium for two weeks, showed significant improvements in various categories of writing errors compared to the control group (CG), which did not use Grammarly. The total number of errors decreased markedly in the EG from 794 before using Grammarly to 122 after using Grammarly. In contrast, the CG, which did not have access to Grammarly but had only feedback from teachers, had a slight decrease in the total number of errors from 743 to 646 during the same period as Table 1 demonstrates.

Table 1. *Error types and number of revisions using Grammarly*

Error types	Experimental group		Control group	
	Before using Grammarly	After using Grammarly	Before the teacher's feedback	After the teacher's feedback
Verb form	118	26	126	106
Word choice	75	12	68	48
Word form	32	8	28	19
Articles	98	12	111	87
Spelling	45	3	54	48
Punctuation	135	13	102	116
Preposition	78	5	67	62
S V agreement	31	8	24	21
Sentence structure	85	11	79	81
Informal	97	24	84	58
Total number of errors	794	122	743	646

Percentage of Reduction: EG Error Reduction: 84.6%, CG Error Reduction: 13.1%.

Confidence and self-efficacy assessment. The pre-and post-intervention surveys aimed at assessing confidence and self-efficacy in academic writing.

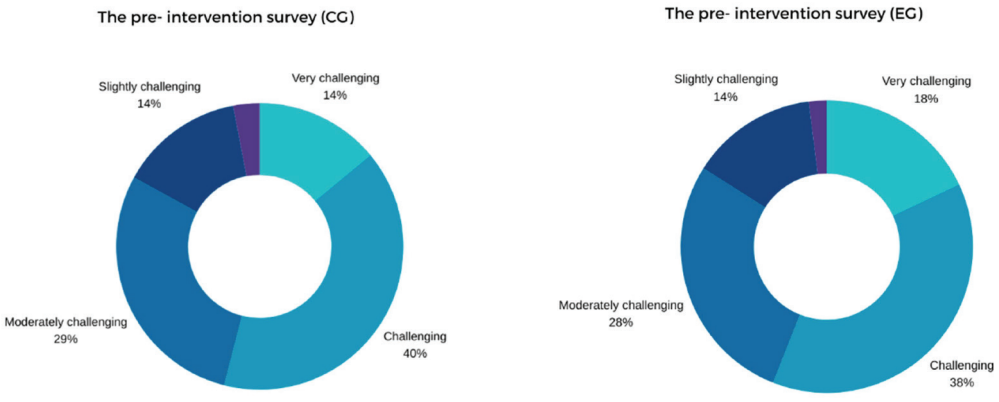

Figure 1: The pre-intervention survey results for CG and EG

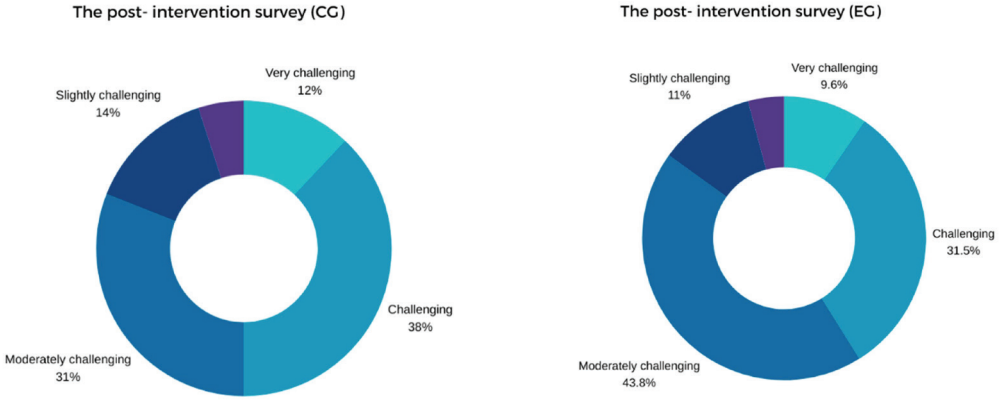

Figure 2: The post-intervention results for CG and EG

As shown in Figure 1 and Figure 2, the surveys revealed significant improvements in students' perception and attitude towards Academic writing assignments in the EG compared to the CG. Confidence levels were identified through the range of options to answer, starting from "Very challenging" and ending with "Not challenging at all".

Change in perceptions of the EG shows a significant decrease in the number of students finding the task «Very challenging» and «Challenging». This indicates a shift towards finding the task less difficult, which could suggest that the intervention (possibly an educational tool or method) was effective in making the task feel easier. There is a slight increase in those finding it «Moderately challenging» and a small increase in those who think it's «Not challenging at all», further supporting the effectiveness of the intervention in improving task approachability or understanding.

Changes in Perceptions of the CG are less pronounced, with minor decreases in the «Very challenging» and «Challenging» categories and small increases in «Moderately challenging» and «Not challenging at all». The relatively stable perceptions suggest that without the intervention, the task's difficulty remained fairly constant for most students. The consistency in the «Slightly challenging» category indicates no significant shift in difficulty perception among a portion of the CG.

Comparing the changes between the EG and CG, it appears that the intervention had a positive impact on the EG, helping them perceive the task as less challenging than the CG. This suggests the effectiveness of whatever method or tool was applied to the EG.

Self-efficacy was measured using a validated scale (Bandura, 2006) as shown in Table 2, and indicated that the EG's average score improved from a pre-intervention average of 2.8 out of 7

on a 7-point Likert scale to 5.6 post-intervention. The CG's scores showed little change, moving from 2.9 to 3.1.

Both groups displayed improvements in confidence and self-efficacy post-intervention, with the EG showing more substantial gains.

Table 2. *Confidence and Self-Efficacy Scores*

Measurement	Group	Pre-intervention	Post-intervention	Change
Confidence	EG	3.4	5.8	+2.4
	CG	3.5	4.1	+0.6
Self-Efficacy	EG	2.9	5.5	+2.6
	CG	3.0	3.4	+0.4

The use of Grammarly Premium significantly aided the EG in reducing the number of writing errors across all categories. This improvement suggests that real-time grammar feedback can effectively enhance the accuracy of student writing. Moreover, the substantial increases in both confidence and self-efficacy scores among the EG participants indicate that access to corrective feedback through Grammarly not only helps improve writing quality but also positively impacts students' beliefs in their writing capabilities. Conversely, the CG's minimal gains highlight the potential limitations of traditional academic writing instruction without supplemental technological support. These findings suggest that tools like Grammarly can play a critical role in enhancing academic writing instruction and student performance.

Discussions. The results of this quasi-experimental study demonstrate that Grammarly support significantly enhances the confidence and self-efficacy of high school students in academic writing. These findings align with previous research, which indicates that digital tools can improve writing quality and affect students' perceptions of their writing abilities positively.

The substantial reduction in grammatical errors among the EG underscores the effectiveness of Grammarly in enhancing academic writing. The EG showed an 84.6% reduction in errors, which starkly contrasts with the 13.1% reduction observed in the CG. This significant disparity highlights Grammarly's role in providing immediate, actionable feedback that is more effective than traditional feedback mechanisms alone. Such feedback likely helps students identify and understand their mistakes in real time, facilitating a deeper learning process and improving their writing skills.

The improvements in confidence and self-efficacy scores in the EG further attest to the benefits of Grammarly. The increase from an average of 3.4 to 5.8 on a 7-point Likert scale for confidence, and from 2.9 to 5.5 for self-efficacy, suggests that continuous engagement with corrective feedback not only aids in decreasing errors but also boosts students' belief in their writing capabilities. This finding is consistent with the Social Cognitive Theory (Bandura, 1986), which posits that successful experiences, such as observing self-improvement in writing, enhance self-efficacy. The CG's minimal gains in these areas highlight the potential limitations of relying solely on traditional teaching methods without supplemental technological support.

From a theoretical standpoint, these results enrich our understanding of how technological interventions like Grammarly can serve as practical tools in educational settings, supporting the Theory of Self-Regulated Learning (Zimmerman, 2000). Practically, the findings suggest that educational institutions might consider integrating such tools into their curriculum to enhance students' writing skills systematically.

It is important to note that Grammarly's impact can vary depending on individual factors and usage patterns (Perdana et al., 2021). While the tool is a valuable resource, it's crucial to

recognize its limitations and supplement its use with human judgment and careful proofreading (O'Neill & Russell, 2019a). To maximize the benefits of Grammarly, educators should provide appropriate instruction and guidance on its use, along with implementing assessment-based evaluation rubrics (Ashrafganjoe et al., 2022). The tool's tendency to overlook or misidentify errors, provide inaccurate or excessive advice, and function only with an internet connection were considered serious drawbacks as well (O'Neill & Russell, 2019b). Furthermore, the free version of Grammarly imposes restrictions on its corrective capabilities, necessitating a paid subscription for full access (Fitriana & Nurazni, 2022). Grammarly's effectiveness in enhancing the structural and substantive aspects of writing may be hindered by its inability to recognize certain proper nouns, particularly those specific to regional or cultural contexts (Javier, 2022). The tool's reliance on a stable internet connection and potentially high-speed internet connectivity can also pose challenges for users (Yousofi, 2022).

Conclusion. In conclusion, this study confirms that Grammarly significantly reduces writing errors and enhances both the confidence and self-efficacy of high school students in academic writing. These findings not only advocate for the integration of advanced technological tools in education but also highlight the importance of providing students with resources that support their writing and learning journeys effectively. As educational technology evolves, its role in fostering educational outcomes and student development will undoubtedly continue to be a critical area of research and application. The study's limitations should be acknowledged despite the aforementioned promising findings. The non-randomized design and the short duration of the intervention may affect the generalizability of the results. Additionally, the study was conducted within a single educational institution, which may limit the applicability of the findings across different educational contexts or cultural backgrounds. Future research should consider longer intervention periods to examine the sustained impact of Grammarly on students' writing skills and self-efficacy. Studies could also explore the effects of Grammarly in different academic disciplines and educational levels to determine its broader applicability. Furthermore, qualitative studies could provide deeper insights into students' subjective experiences and perceptions while using Grammarly, contributing to a more nuanced understanding of how digital tools influence learning processes.

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IRSTI 14.25.07 10.51889/2960-1649.2024.61.4.005

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THE PECULIARITY OF NEURO-DIDACTIC CONTENT AIMED AT DEVELOPING THE INTELLIGENCE OF PRIMARY SCHOOL STUDENTS

Abstract

The article describes the specifics of neurodidactic content aimed at developing the intelligence of primary school students. The theoretical foundations of neurodidactic, including the concepts of neuroplasticity and cognitive development, are considered. The neuro-didactic content aimed at developing the intelligence of younger schoolchildren is analyzed. The meaning of the concept of neuro-didactic content is revealed, its definition is given, and its effectiveness and capabilities are revealed. A survey was conducted to determine the knowledge of primary school teachers about neurophysiological features, the development of the intelligence of primary school students, and neurodidactic content, to determine what work they do in the development of the intelligence of their students, and to clarify the content of neurodidactic content and determine the possibility of neurodidactic content in the development of students ' intelligence. The results were verified using a coefficient scale and displayed as a diagram and a table. According to the survey results, the educational level of primary school teachers in intelligence development with the help of neurodidactic content was determined, as well as the content of neurodidactic content for the development of intelligence of younger schoolchildren.

Keywords: neurodidactic, neuropsychology, intelligence, neuro-didactic content, primary school student.

Introduction. In the modern educational process, one of the key tasks is the development of intellectual abilities in younger schoolchildren, which requires the implementation of innovative approaches and teaching methods (Liljestrand, 2024; Herodotou et al., 2019). In this context, neurodidactics, a field based on the integration of neuropsychology and pedagogy, becomes particularly important. Neurodidactic content is aimed at activating cognitive processes in children, such as memory, attention, and thinking, which not only contributes to the successful assimilation of educational material but also fosters overall intellectual development.

The uniqueness of neurodidactic content lies in its ability to take into account the individual neuropsychological characteristics of each student, allowing educational programs to be maximally adapted to their needs and peculiarities. This is especially relevant in primary school, where children are just beginning to develop basic learning skills and key cognitive functions. It is important to note that such content is based on scientific research and experimental data, ensuring its effectiveness and success in educational practice.

Exploring the features and potential of neurodidactic content for younger schoolchildren opens up new prospects in the field of education, offering teachers and learning specialists innovative tools for fostering a lasting interest in learning and advancing children's intellectual abilities to a new level.

At the core of neurodidactics is the belief that cognitive skills can be purposefully developed through targeted educational techniques. By focusing on exercises that engage specific brain functions, neurodidactic methods help lay a foundation for lifelong learning capabilities. Such techniques enable young students to approach learning with increased concentration, resilience, and flexibility, which, according to recent research, are essential traits for successful academic and personal growth (Liljestrand, 2024).

Furthermore, neurodidactics emphasizes creating a stimulating classroom environment

that integrates hands-on activities and interactive experiences. These types of activities help bridge theoretical knowledge with practical skills, making learning both engaging and effective. As studies indicate, children who are actively involved in such neurodidactic exercises not only retain information better but also develop a deeper understanding of the material, which contributes to sustained intellectual development (Sousa, 2016).

The ultimate goal of the neurodidactic approach is to develop stable cognitive skills in young schoolchildren that will facilitate their successful adaptation to the learning process and foster lifelong intellectual abilities. In primary education, the integration of neurodidactic content not only helps children better assimilate educational material but also cultivates a motivation for learning, an interest in independent study, and readiness to tackle complex tasks. Thus, exploring the features and potential of the neurodidactic approach opens new prospects for education, offering teachers and specialists modern tools for effectively advancing the intellectual potential of young students.

Materials and methods. In recent years, the issue of developing the intellect of younger schoolchildren has gained particular relevance due to the changing demands on educational systems. Modern research highlights that traditional teaching methods, primarily focused on knowledge transfer, often fail to meet the new challenges related to the need for children to develop more complex cognitive and metacognitive abilities (Farkhutdinova, 2022; Lane et al., 2022).

Many researchers, such as Gardner (2008) and Renzulli (2020), point out the necessity of moving from a knowledge-based teaching model to one that fosters critical thinking, creativity, and problem-solving skills. These changes are driven by the needs of contemporary society, which requires individuals to be highly adaptable and capable of lifelong learning.

Studies by neuropsychologists, including the work of Kovach (2013), show that younger schoolchildren are at a critical stage of cognitive development, where it is crucial to support and stimulate functions like attention, memory, and logical, and spatial thinking. However, traditional curricula often do not account for individual differences in the development of these cognitive functions, which can lead to decreased learning motivation and academic performance.

The literature also emphasizes the challenges associated with the need to individualize the educational process. Lebedeva (2020) and Petrova (2022) note that modern students have diverse cognitive profiles that require differentiated approaches. However, schools often lack the tools and methods to effectively address these differences in the learning process.

A significant influence on the cognitive development of younger students is the digital environment in which they are growing up. Studies by Carr (2020) and Ivanova (2022) show that constant interaction with gadgets and multimedia resources alters how information is perceived and reduces the ability to concentrate. This places an additional burden on educators to not only develop cognitive skills but also teach children to interact effectively with information streams.

Moreover, recent studies emphasize the importance of neuroeducational literacy for teachers, as this knowledge can greatly enhance the effectiveness of education. Zhumabayeva et al. (2024) found that comprehensive neuroscience training significantly improved the neuroeducational literacy of prospective teachers in Kazakhstan, equipping them with valuable insights into students' psychophysical development. This neuroeducational literacy allows teachers to implement more effective strategies for cognitive and behavioral engagement in the classroom, fostering a more individualized learning environment and aligning with neurodidactic approaches (Zhumabayeva et al., 2024).

Against the backdrop of these challenges, the topic of neurodidactic content is becoming highly relevant. Neurodidactics offers a scientifically grounded approach that considers the brain's functioning and neuroplasticity during the learning process. This allows for the development of educational programs aimed at

the optimal development of cognitive functions, taking into account the individual characteristics of each student.

Studies also show that digital competencies are gaining increasing importance in the educational environment of younger schoolchildren, especially in aspects of safety and the ability to navigate the digital space. Li et al. (2024) developed a Digital Intelligence Quotient (DQ) scale for Chinese primary school students, which allows for identifying their level of development of key digital skills. The scale includes seven components covering aspects such as digital identity, safety, and emotional intelligence, emphasizing the necessity of these competencies in primary education (Li et al., 2024).

First, neurodidactic content is based on data about how different types of information are perceived and processed by the brain. This helps educators use methods and materials that most effectively stimulate the development of memory, attention, and other cognitive processes in younger students.

Second, neurodidactics promotes individualized learning, addressing the challenges posed by the diversity of students' cognitive profiles. This is especially important in primary school, where the foundations of a child's learning motivation and self-esteem are established.

Third, neurodidactic approaches help children adapt to the digital environment, developing critical information perception skills and the ability to concentrate in a world saturated with diverse information streams.

Thus, research confirms that neuro didactic content not only meets modern educational requirements but also has the potential to overcome existing problems in the education of younger schoolchildren, making its implementation in educational practice, especially important.

In recent years, there has been a noticeable increase in interest in integrating neuropsychology into educational practice. This trend is driven by a growing understanding that successful learning is impossible without considering the brain's functioning, cognitive processes, and neuroplasticity.

1. Growing Interest in Neuropsychology in Education:

Modern research emphasizes that traditional teaching methods often overlook individual differences in the development of cognitive functions such as attention, memory, and thinking. In this regard, neuropsychology offers valuable insights into how the brain perceives, processes, and stores information. This knowledge enables the creation of more tailored educational methods that promote effective learning for each child, regardless of their characteristics.

2. The Promise of the Neurodidactic Approach:

The neurodidactic approach, based on the principles of neuropsychology, is considered promising for several reasons:

-neurodidactics enables the development of educational programs that take brain mechanisms into account, thereby promoting deeper and more sustained knowledge retention. These programs include exercises and tasks that stimulate specific brain areas, strengthening neural connections and enhancing cognitive functions.

-one of the key advantages of the neurodidactic approach is its ability to adapt to the individual cognitive profiles of students. This is particularly important in primary school, where the foundation for future academic success is laid. Neurodidactics offers methods that cater to each child's learning pace and style, fostering more successful intellectual development.

-the neurodidactic approach is based on verified neuropsychological data, making it a reliable tool in educational practice. Unlike traditional methods, which are often based on intuitive approaches, neurodidactics offers objective, scientifically grounded solutions to improve students' cognitive abilities.

- in an information-driven world, where children are exposed to vast amounts of data and digital technologies, neurodidactics help develop critical thinking skills and the ability to concentrate. This makes it particularly relevant in the context of modern educational demands.

Thus, the integration of neuropsychology into educational practice through neuro didactic approaches not only enhances the effectiveness of learning but also addresses modern challenges related to the need for individualization and adaptation of educational programs to new conditions.

Neurodidactics is based on several key theories and concepts that explain how cognitive processes develop and function in the brain, and how they can be optimized through targeted learning. These theories and concepts allow the development of educational programs that effectively nurture the intellect of younger schoolchildren.

One of the foundational concepts of neurodidactics is neuroplasticity, the brain's ability to change and adapt in response to learning and new experiences. The research of Merzenich (2013) demonstrated that the brain remains plastic throughout life, and new neural connections can form in response to learning, which is a key aspect of an effective educational process.

Neurodidactic approaches apply the principle of neuroplasticity to design learning programs that stimulate the active involvement of various brain areas. For example, exercises aimed at solving logical problems or developing memory help strengthen neural connections and improve students' cognitive functions. This not only aids students in absorbing new knowledge but also develops skills such as attention and problem-solving abilities.

Cognitive development theories, such as Piaget's theory (1951) and Lev Vygotsky's (1978), cultural-historical theory also form the foundation of neurodidactics. Piaget (1951) proposed that children go through specific stages of cognitive development, each characterized by distinct ways of thinking and understanding the world. Vygotsky emphasized the importance of social context and interaction in the development of cognitive functions.

Neurodidactic approaches take these developmental stages into account and create learning materials that align with children's age-related cognitive characteristics. This enables children to effectively absorb information suited to their level of cognitive development, gradually progressing to more complex tasks. For example, classification and seriation exercises can be used to strengthen logical thinking at early stages of education.

Modern learning theories, such as Paivio's (2014) dual coding theory and Sweller's (2016), cognitive load theory explore how information is processed by the brain and how different forms of information representation can influence its retention. Paivio (2014) asserts that information is better remembered when presented in both verbal and visual forms, a concept actively applied in neuro didactic methods.

Neurodidactics also considers the cognitive load, aiming to minimize it to prevent overloading students' working memory. This is achieved by breaking down complex information into smaller, manageable parts, allowing students to gradually and efficiently assimilate new material. Studies, such as the work of Geiger and Brewster (2009), show that neuro didactic methods can significantly enhance cognitive functions like memory, attention, and thinking. For example, working memory training exercises used in neuro didactics help children better retain and process information, improving their performance across various academic subjects.

In addition, methods like mindfulness, which are also incorporated into neuro didactic programs, contribute to improving attention span and reducing stress levels in younger schoolchildren. This, in turn, positively affects their overall cognitive and emotional development. Many neurodidactic programs also utilize principles of multisensory learning, based on the idea that learning through multiple sensory channels (sight, hearing, touch) promotes better retention and understanding of material. Gardner's (2008) work on multiple intelligences supports the use of various sensory and cognitive approaches to meet the individual needs of students.

Thus, neuro didactics, drawing on fundamental theories of neuroplasticity, cognitive development, and neuropsychological learning principles, offer approaches that not only enhance cognitive functions but also adapt to

the individual characteristics of students. This makes it a vital tool in modern education, aimed at the intellectual development of younger schoolchildren.

In recent years, numerous empirical studies have been conducted to evaluate the effectiveness of neuro didactic approaches in teaching younger students. These studies provide valuable data on which methods have the greatest impact on the development of cognitive abilities and how individual differences among children affect their academic performance when using neurodidactic materials:

1. In a study conducted by Hoffman and Van Dijk (2018), the effectiveness of a neurodidactic approach based on cognitive exercises to enhance memory and attention in younger schoolchildren was assessed. In the experimental group, children participated in regular training that included tasks focused on working memory, logical thinking, and attention concentration. The results indicated a significant improvement in these cognitive functions among the children in the experimental group compared to the control group, which continued with a traditional curriculum. This confirms that the targeted use of neuro didactic materials contributes to the enhancement of cognitive abilities.

2. Another study conducted by Carson (2021) focused on the application of multisensory learning methods actively used in neurodidactic programs. Children participated in lessons that included visual, auditory, and kinesthetic stimuli simultaneously. The results showed that such lessons facilitate a deeper understanding and retention of material, particularly among children with diverse cognitive styles. Specifically, children with dominant visual and kinesthetic perceptions demonstrated the greatest progress, highlighting the importance of an individualized approach to learning.

3. Research by Blackwell and Duckworth (2016) emphasizes that individual characteristics of children play a crucial role in how they perceive and assimilate neuro didactic materials. In their study, younger schoolchildren with high levels of anxiety showed significant improvements in academic performance after participating in neuro didactic programs aimed at reducing stress and enhancing attention concentration. Conversely, children with higher initial cognitive functioning and no signs of anxiety experienced smaller, yet still significant, benefits from such programs.

4. Another interesting direction in neurodidactics involves the use of game methods and neurofeedback technologies. A study by Jenkins (2020) demonstrated that using gaming applications based on neuro didactic principles significantly enhances motivation for learning and improves cognitive metrics, such as working memory and problem-solving ability. Specifically, children using gaming neurodidactic applications exhibited higher engagement levels and better retention of educational material compared to traditional teaching methods.

5. A review study by Brown (2014), covering over 20 different studies, showed that neuro didactic methods are generally more effective than traditional approaches in teaching younger schoolchildren. The research highlights that the greatest effects are observed in areas related to the development of attention, memory, and creative thinking. However, studies indicate that traditional methods may be more effective in teaching basic academic skills, such as reading and arithmetic, especially in the early stages of education.

Based on the analysis of existing empirical research, it can be concluded that neurodidactic approaches hold significant potential for enhancing the cognitive functions of younger schoolchildren, particularly in areas such as attention, memory, and creative thinking. Methods that incorporate multisensory learning and gaming technologies show the most notable results, especially when adapted to the individual characteristics of students.

Individual differences, such as baseline cognitive function, levels of anxiety, and cognitive perception styles, play an important role in determining how successful the use of neuro didactic methods will be. This underscores the need for careful selection and adaptation of neuro didactic materials for each child, making this approach promising and relevant in the context of modern educational demands.

Contemporary educational research increasingly turns to neurodidactic approaches, which are based on understanding how the brain processes information and how these processes can be optimized for more effective learning. Comparing neurodidactic methods with traditional approaches allows for a deeper understanding of their advantages and highlights the limitations of traditional methodologies that neurodidactics can overcome.

One of the key advantages of neurodidactic methods is their ability to consider individual differences among students, such as cognitive style, baseline cognitive function, and emotional state. Traditional teaching methods often apply a one-size-fits-all approach, which can lead to situations where children with varying cognitive styles or emotional characteristics do not receive optimal learning conditions.

Students in traditional programs often face challenges related to low motivation and difficulty maintaining attention. In contrast, neuro didactic approaches, such as multisensory learning and the incorporation of game elements, promote greater student engagement and improve cognitive outcomes.

Unlike traditional methods that frequently focus on rote memorization and repetition, neuro didactic methods actively stimulate cognitive development through adaptive exercises. These exercises target the development of key cognitive functions, such as memory, attention, and problem-solving ability. Hoffman and Van Dijk's (2018) study showed that students engaged in neurodidactic programs exhibited significant improvements in working memory and attention tests, whereas students in traditional programs showed only minor progress.

Traditional teaching methods often impose a high level of cognitive load on students, which can lead to overloading working memory and decreasing learning effectiveness. Neurodidactics, on the other hand, focuses on reducing cognitive load by optimizing information delivery and utilizing principles from cognitive science, such as Sweller's (2016) cognitive load theory. For instance, Sweller and Chandler's (2015) study showed that students taught through traditional methods with high cognitive load often struggle to understand material, while the use of multimedia and visual aids proposed by neuro didactic methods significantly facilitates knowledge acquisition.

Traditional teaching methods frequently fail to account for students' individual needs, leading to decreased learning efficiency. Neurodidactic approaches, in contrast, offer adaptive techniques that align with each student's cognitive characteristics. Research in neuropsychology, such as Baddeley et al., (2015) work on working memory models, demonstrates that students with different cognitive styles can significantly improve their outcomes when learning is tailored to their needs.

Moreover, traditional methods often suffer from a lack of student motivation and engagement. Neurodidactics addresses this issue by incorporating gaming technologies and gamification elements, which have proven effective in several studies (Jenkins, 2020). These methods make learning more engaging and meaningful for students, enhancing material retention.

Another limitation of traditional methods is the difficulty in maintaining students' attention, particularly in early grades. Neurodidactics overcomes this challenge by employing techniques aimed at developing concentration and focus. For example, mindfulness practices, explored in Kabat-Zinn's (2018) work, have shown that regular use in educational programs significantly improves students' ability to focus on learning material.

Literature analysis indicates that neuro didactic approaches offer substantial advantages over traditional teaching methods, particularly in fostering cognitive abilities in younger schoolchildren. Key aspects, such as accounting for individual differences, reducing cognitive load, and enhancing motivation and engagement, make neurodidactics more effective compared to conventional approaches.

Furthermore, neuro-didactics is capable of overcoming several limitations inherent in traditional methods, such as insufficient adapta-

tion to individual needs, attention retention issues, and low student motivation. These advantages render neuro didactic approaches promising and relevant in the context of modern educational demands focused on developing intelligence and cognitive abilities in younger students.

Despite the many benefits, neuro didactic approaches face several challenges and limitations in their development and implementation. These factors need to be considered for the successful integration of neuro didactic methods into educational practice.

One of the main challenges in implementing neuro didactic approaches is the need for teacher training. Traditional teacher education often does not include training in the principles of neuropsychology, making the transition to new methods challenging. Research by Klimenko (2021) emphasizes that successful implementation of neuro didactic programs requires significant investments in professional development for educators. Teachers need to have not only basic knowledge of neuropsychology but also the ability to apply this knowledge in practice.

Neurodidactic approaches must be tailored for various age groups, requiring consideration of the cognitive development characteristics of each stage. For example, methods that are effective for older students may be too complex or ineffective for younger children. Johnson and Thompson (2016) highlight that age specificity is a key factor in the success of neuro didactic programs. Researchers point out the necessity of creating differentiated programs that take into account the age and cognitive characteristics of students.

Another important aspect is the adaptation of neuro didactic materials to different cultural contexts. Cultural differences can influence the perception and assimilation of educational content, making it essential to consider these factors when developing materials. For instance, research by Kim & Hwang (2016) shows that methods successful in one cultural context may be less effective in another if they are not adapted to the specifics of local culture and educational traditions.

While research in the field of neurodidactics continues to develop, there is still insufficient empirical data to conclusively confirm the effectiveness of all proposed approaches. As Cartwright (2020) notes, there is a need for longer and larger-scale studies that can provide more accurate data on the long-term effects of applying neuro didactic methods. Additionally, studies need to account for individual differences among students to better understand which methodologies are suitable for various categories of learners.

Despite the challenges mentioned, neurodidactic approaches present significant prospects for the educational system:

1. One of the key trends for the future is the development of personalized learning, where neuro didactic methods can play an important role. Research in artificial intelligence and adaptive learning (Brown, 2014; Wang, 2023) shows that technology can be used to create individualized learning paths that take into account each student's cognitive characteristics. Such approaches will help maximize the potential of every child by adapting educational materials and methods to their needs.

2. Technological progress also fosters the development of neurodidactics. The use of virtual and augmented reality, gaming technologies, and neurofeedback opens up new opportunities for creating interactive and engaging educational programs. For instance, research by Jenkins (2020) shows that using VR technologies allows students to immerse themselves more deeply in the learning process, which enhances memory retention and understanding of the material.

3. Neurodidactics has the potential to become an interdisciplinary field, combining the achievements of neuropsychology, pedagogy, cognitive science, and technology. In the future, we can expect an increase in research and practical programs where neuro didactic approaches will be integrated with innovations in educational technologies and developmental psychology. This interdisciplinary collaboration could lead to the creation of more effective and comprehensive educational programs that address not only

cognitive but also emotional and social aspects of student development.

The analysis of the existing literature highlights both the significant advantages of neuro didactic approaches and the challenges that need to be addressed for their successful implementation in educational practice. Key aspects to focus on include teacher training, adaptation of materials to age and cultural contexts, and the necessity for more extensive research.

Nevertheless, the prospects for the development of neurodidactics are impressive. Advances in technology, interdisciplinary collaboration, and growing interest in personalized learning create favorable conditions for the further evolution of this field. In the future, neuro didactics could become the foundation for creating more effective and individualized educational programs that enhance the cognitive development of younger students and improve their educational outcomes.

Moreover, the literature on neuro didactic content reveals not only the benefits but also a range of contradictions, shortcomings, and gaps that require further exploration and reflection.

There are conflicting data regarding the effectiveness of neuro didactic approaches compared to traditional teaching methods. Some studies demonstrate clear advantages of neuro-didactics, while others show no significant differences in student outcomes. For instance, research by Hoffman & Van Dijk (2018) claims that neuro didactic methods significantly improve cognitive functions such as attention and memory; however, Miller (2016) found no notable differences in memory test results between students taught using traditional methods and those taught using neurodidactic approaches. This discrepancy suggests a need for further investigation into the factors influencing method effectiveness and the contexts in which neuro-didactics are most effective.

There are also contradictions regarding the universality of neuro didactic methods. Some studies assert that these approaches can be universally applied across all age groups and cultural contexts, while others emphasize the need for adaptation. For example, Kim (2016) highlights the importance of culturally adapting materials, whereas some argue that neuro didactic principles can be applied in various cultural contexts without significant modifications. This indicates a need for a deeper exploration of the universality and adaptability of neuro didactic materials.

Limitations of Existing Research. 1. Many studies in the field of neurodidactics are based on limited sample sizes, raising questions about their representativeness and the ability to extrapolate results to a broader student population. The lack of large longitudinal studies makes it difficult to assess the long-term effects of neuro didactic methods on children's cognitive development. For example, most studies, such as those by Johnson and Thompson (2016), are constrained to the timeframe of a single academic year and do not consider long-term cognitive changes.

2. While neurodidactics is grounded in several neuropsychological theories, such as Sweller's cognitive load theory and Baddeley's working memory theory, it still requires a deeper theoretical foundation. For instance, the mechanisms through which neuro didactic methods impact various cognitive functions, such as critical thinking and creativity, are not well understood. Furthermore, there is a lack of research that integrates different theoretical approaches, which could contribute to a more cohesive and well-founded methodology.

Research Gaps in the Topic. 1. Most studies focus on the cognitive aspects of neuro-didactics, while the impact of these methods on the development of social and emotional skills remains insufficiently explored. For instance, neuro didactic methods may enhance emotional resilience and teamwork skills, but these findings require further validation and the development of specific methodologies for their implementation.

2. Although individual student characteristics are often mentioned as an important factor in neurodidactics, there is a limited number of studies that examine how these characteristics influence learning success in detail. Specifically, research is needed to explore how neuro didactic methods can be adapted for children with varying cognitive abilities, such as those with

developmental delays or special educational needs.

3. Most existing research is conducted within the framework of formal education, while the influence of neurodidactic methods on informal and supplemental education remains largely unstudied. For example, it is essential to investigate how these approaches can be applied in clubs, summer camps, and other informal educational settings.

Perspectives for Future Research. 1. Given the identified gaps and limitations, a promising direction may be the development of adaptive neurodidactic methods that consider both the cognitive and socio-emotional characteristics of students. For instance, creating individualized learning programs that dynamically adjust to the child's cognitive load and emotional state could significantly enhance learning effectiveness.

2. The future of neurodidactics lies in interdisciplinary research that integrates insights from neuropsychology, cognitive science, pedagogy, and educational technology. Such studies could facilitate the creation of new, more comprehensive methodologies that account for the full spectrum of cognitive, emotional, and social factors influencing learning.

3. To gain a deeper understanding of the long-term effects of neuro-didactics, longitudinal studies are needed to track the cognitive and emotional development of students over several years. This would reveal how neuro didactic methods impact students' long-term success and contribute to the development of sustainable skills and knowledge.

4. More comparative studies are necessary to examine the effectiveness of neuro didactic methods across different cultural and educational contexts. This would help tailor approaches and methods to the specific needs and characteristics of diverse student groups, making neuro didactics more universal and flexible.

A critical analysis of the literature reveals that while neuro didactic approaches hold significant potential, they also face several challenges and limitations. There are contradictions in assessing their effectiveness, issues with method adaptation, and a lack of theoretical foundation, all of which require further academic inquiry. However, the prospects for neurodidactics, especially in the context of interdisciplinary and adaptive research, position this field as one of the most promising areas in modern pedagogy.

48 primary school teachers from Almaty took part in the survey.

A survey was used to summarize the data. The questionnaire was given to determine the knowledge of primary school teachers about neurophysiological features, the development of intelligence of Primary School students, neuro didactic content, to determine what work they carry out in the development of intelligence of their students, and to clarify the content of neuro didactic content and determine the possibility of neuro didactic content in the development of students ' intelligence.

The content of the survey was as follows:

1. What are neurophysiological features?

2. Do you care about developing the intelligence of Primary School students?

3. what work do you do to develop the intelligence of your students?

4. What is Neurodidactic content?

5. Do you think Neurodidactic content has the potential to develop students ' intelligence? What if there is?

6. Determine the effectiveness of activities that affect the development of students ' intelligence:

Exercises for fine motor skills
Sports games
Breathing exercises
Role-playing games
Exercises for swimming
Exercises for movement
Group travel
Exercises for maintaining balance
Exercises for the eyes
Refreshing moments
Exercises for articulation
Drawing
Another.

In the output of the survey result, we used the variance of the arithmetic mean of the squares of the deviations of the given values from the arithmetic mean of the survey.

Results. 48 primary school teachers from Almaty took part in the survey. To determine their knowledge of neurophysiological features, the question «What are neurophysiological features?» the question was asked. As a result, out of 48 primary school teachers who answered this question, 16 of them answered 33.4% completely correctly, 21 of them answered only partially 43.7%, and the remaining 11 did not answer correctly 22.9%. The result of the question is shown in Figure 1.

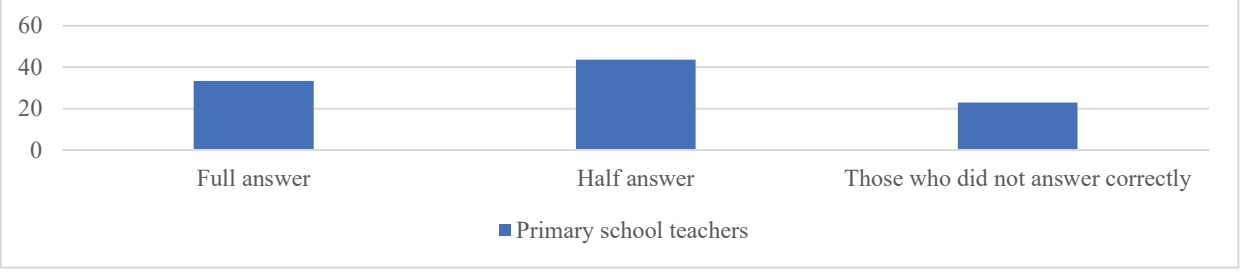

Figure 1: Result of Question 1 of the survey

To determine whether primary school teachers perform work on the development of the intelligence of their students in the educational process, it is necessary to ask the question: «Do you attach importance to the development of intelligence of Primary School students? Why don't you give it to me?» the question was given. While it was found that 87% of teachers pay attention to the development of intelligence in their students, 32% noted the lack of special hours for the development of intelligence, 46% noted the lack of a special elective course, 14% noted the lack of special educational and methodological complexes, 8% noted the limitation of time in the lesson. The result of the question is shown in Figure 2.

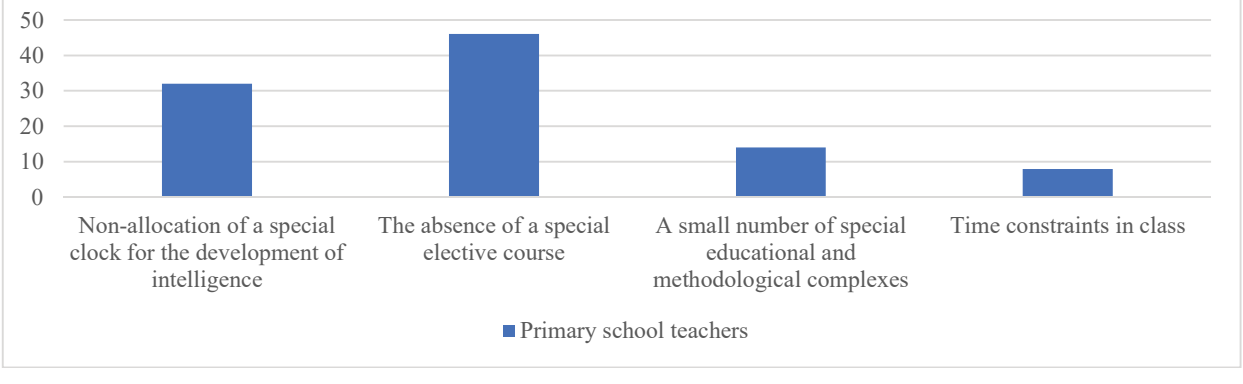

Figure 2: Result of Question 2 of the survey

To determine what work teachers, do in the development of the intelligence of Primary School students, it is necessary to ask the question: «What work do you do in the development of the intelligence of their students?» the question was given. As a result, 48% of the respondents showed that they use Psycho-diagnostic methods, 14% artificial intelligence, 19% logical tasks, 6% neuroleptics, and 13% didactic games. The result of the question is shown in Figure 3.

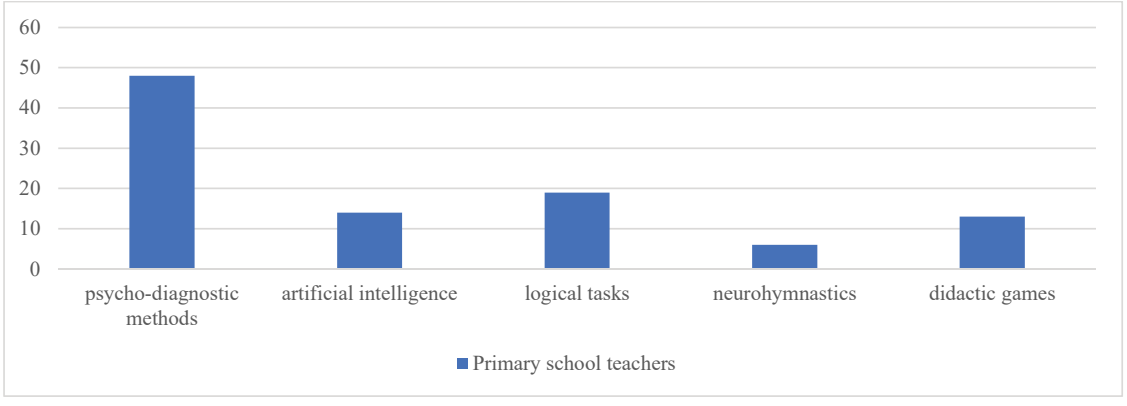

Figure 3: Result of Question 3 of the survey

To determine the participants ' knowledge of neurodidactic content, the question «What is Neurodidactic content?» the question was asked. As a result, 21% of respondents answered this question completely correctly, 38% wrote only partially, the remaining 24% did not answer correctly, and 17% did not answer. The result of the question is shown in Figure 4.

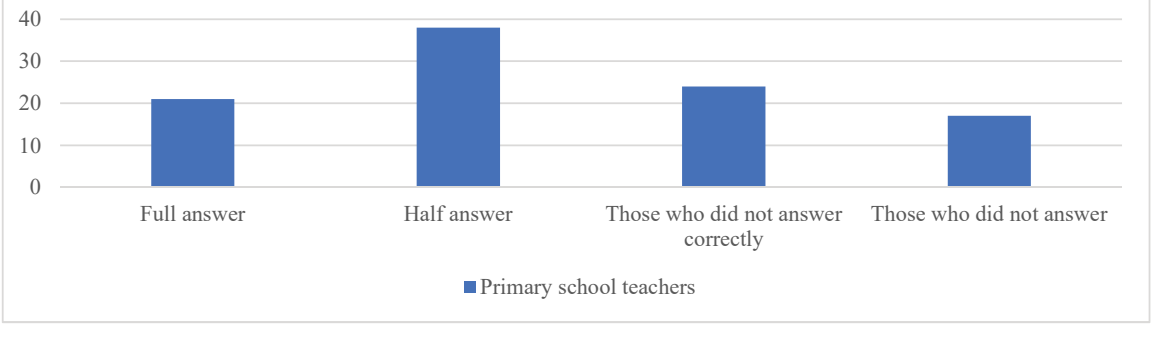

Figure 4: Result of Question 4 of the survey

To determine what potential neurodidactic content has in developing students ' intelligence, teachers are asked, «Do you think Neurodidactic content has in developing students' intelligence? What if there is?» the question was asked. As a result, teachers showed that 100% of neuro didactic content has a very high chance of developing students ' intelligence. As an opportunity for neuro didactic content, 23% of teachers identified the development of fine motor skills, 21% breathing, 24% movement, 15% articulation, 5% memory, 8% imagination, and 4% speed reading. The result of the question is shown in Figure 5.

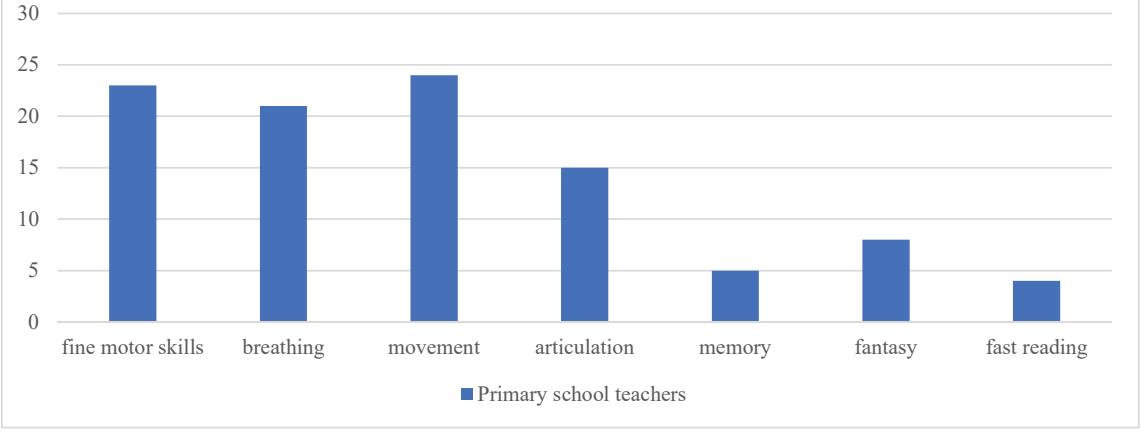

Figure 5: Result of Question 5 of the survey

To determine the effectiveness of activities that affect the development of students ' intelligence, teachers are advised to «establish the effectiveness of activities that affect the development of students' intelligence: exercises for fine motor skills, sports games, breathing exercises, role-playing games, swimming exercises, exercises for Movement, group travel, exercises for maintaining balance, exercises for the eyes, toning moments, exercises for articulation, drawing,..» the question was given. The result is presented in *Table 1.*

Table 1. *Result of question 6 of the survey*

№	Answers	%
1	Exercises for fine motor skills	86
2	Sports games	32
3	Breathing exercises	79
4	Role-playing games	21
5	Exercises for swimming	5
6	Exercises for movement	93
7	Group travel	14
8	Exercises for maintaining balance	97
9	Exercises for the eyes	89
10	Refreshing moments	23
11	Exercises for articulation	92
12	Drawing	16
13	Another...	9

Let's check the effectiveness of activities that affect the development of students ' intelligence in the given table. To do this, let's calculate the arithmetic mean of the squares of deviations of the values given in the table from the arithmetic mean using the variance. We calculate it using the following formula.

$$r^2 = \frac{\sum_{i=1}^{n} n_i (n_i^* - M)^2}{n}$$

Table 2. *Variance and standard deviation of events affecting the development of students ' intelligence*

№	Events X_i	% n_i	$\overline{M}$	X_i^*	$\left\|X_i^* - \overline{M}\right\|^2$	$r^2 = \frac{\sum_{i=1}^{13}(X_i - M)^2}{13-1}$	r
1	Exercises for fine motor skills	86	50,46	35,54	1263,092	1460,76	$r = \sqrt{1460,76} \approx 38,21$
2	Sports games	32	50,46	-18,46	340,7716		
3	Breathing exercises	79	50,46	28,54	814,5316		
4	Role-playing games	21	50,46	-29,46	867,8916		
5	Exercises for swimming	5	50,46	-45,46	2066,612		
6	Exercises for movement	93	50,46	42,54	1809,652		

7	Group travel	14	50,46	-36,46	1329,332
8	Exercises for maintaining balance	97	50,46	46,54	2165,972
9	Exercises for the eyes	89	50,46	38,54	1485,332
10	Refreshing moments	23	50,46	-27,46	754,0516
11	Exercises for articulation	92	50,46	41,54	1725,572
12	Drawing	16	50,46	-34,46	1187,492
13	Another...	9	50,46	-41,46	1718,932

In conclusion, it was possible to conclude that most of the given results are located at intervals equal to +38.21 from the arithmetic mean, that is, exercises for fine motor skills, exercises for breathing, exercises for movement, exercises for maintaining balance, exercises for articulation have a positive effect on the development of students ' intelligence.

Discussion. The first question of the questionnaire concerned the assessment of teachers ' knowledge about the neurophysiological characteristics of the child. As a result, we found that primary school teachers have incomplete knowledge and concepts about the neurophysiological characteristics of students. This is still a lack of special courses, educational and methodological complexes, and modern ideas about the neurophysiological features of Primary School students, about the development of their intelligence through neurodidactic content.

Summing up the answers to the first question, it became necessary to organize an advanced training course for primary school teachers to replenish the knowledge of teachers about the neurophysiological characteristics of students. From the answers of the teachers on the second question of the questionnaire, it was found that although they had attempted to develop the intelligence of Primary School students, the lack of allocation of a special hour for the development of intelligence and the limitation of time hindered. In this regard, the need for the organization of an elective course «neurofeedback» specifically for the educational process of primary school has been identified.

As a result of the answers to the third question of the questionnaire, we found that teachers use special psychological test methods that are used in the development of the intelligence of their students. It has been observed that the possibilities of neuro didactic content are not taken into account and are not used in the development of students ' intelligence.

The fourth question of the survey concerned teachers ' knowledge of neuro didactic content. As a result, most teachers showed a low level of knowledge about «neuro didactic content». That is, this increased the meaning of the organization of advanced training courses for teachers to develop the intelligence of Primary School students through autodidactic approaches.

According to the results of the answers to the fifth question of the questionnaire, teachers believe that autodidactic content has the potential to develop students ' intelligence, but indicates insufficient knowledge in the use of ways and methods of its use in the educational process, that, incomplete knowledge was revealed.

The results of the last question of the survey made it possible to identify activities that affect the development of students 'intelligence: most teachers emphasized the importance of exercises for the development of fine motor skills, breathing, vision, movement, and articulation as activities that effectively affect the development of students' intelligence. As a result, the following types of exercises aimed at developing students ' intelligence were identified: exercises for fine motor skills, exercises for breathing, exercises for movement, exercises for the eyes, and exercises for articulation.

Conclusion. In this research work, the problems of neurodidactics considered in the works of foreign and Kazakh researchers were studied, and the theoretical foundations of neurodidactics were studied, including the concepts of neuroplasticity and cognitive development. As a result of the study, the advantages and unique opportunities of autodidactic approaches over traditional teaching methods were revealed. At the present stage, one of the main tasks is the use of innovative approaches to develop the intellectual abilities of Primary School students. In this context, neuro didactics, a direction based on the integration of data from neuropsychology and pedagogy, becomes of particular importance. In this regard, the importance of using neuro didactic content as one of the methods aimed at activating the cognitive processes of children, such as memory, attention, and thinking, contributing not only to the successful assimilation of educational material but also to the general intellectual development, has been established.

To identify the possibilities of autodidactic content in the development of intelligence of Primary School students, a survey was conducted. The results of the study indicate the need to create and implement an educational program of a refresher course on the topic «Development of intelligence of Primary School students through autodidactic approaches» for teachers of primary education, one of the main tasks of which is to improve the knowledge of teachers about the neurophysiological features of the child and their relationship with intelligence. The information obtained in the course of the study made it possible to determine the need and content of the organization of an elective course «Neurohymnastics» specifically for the educational process of Primary School to supplement knowledge about the features of the development of the child's brain and develop intelligence.

Acknowledgment. The research was conducted by The Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan, developed within the framework of the scientific project AP19680117 «Development of neuro didactic content for the development of the intellect of primary school students» of the Ministry of Higher Education and science of the Republic of Kazakhstan.

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IRSTI 14.25.09 10.51889/2960-1649.2024.61.4.006

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DIGITAL RESOURCES AS A MEANS OF SPATIAL EDUCATION

Abstract

Some of the outcomes of environmental management activities, while intended to address global issues, have contributed to new environmental challenges. This is particularly concerning for future generations. To address these problems, scientists have emphasized the importance of promoting environmental literacy. However, even before focusing on environmental literacy, it is crucial to foster responsible and sustainable use of natural resources, which are essential to daily life. Passing down this awareness through generations could help prevent future global environmental crises. Therefore, integrating geographical education into strategies for addressing humanity's challenges is essential. In the study, based on domestic and foreign works, the concepts of teaching environmental management, in particular, information about water sources through digital resources, were analyzed. In addition, in the course of the study of attempts to analyze approaches to teaching the topic «Types of Nature management», research was carried out on tasks in textbooks. The study used descriptive and comparison methods. It is proposed to implement a digital platform in the learning process to enhance the mastery and reinforcement of new lessons, a step that has become increasingly relevant. This platform will incorporate additional tasks and innovative approaches. The study analyzed the platform's capabilities, including how it facilitates information delivery across subjects, and examined its effectiveness, along with potential barriers to its application. Various studies on teaching approaches in environmental management were also reviewed and compared. The findings can contribute to improving methods and practices in geographic education.

Keywords: geographical education; nature management; digital resource; Environment, Water Resources; 3D technology platform.

Introduction. The effective use of Natural Resources is one of the main problems today. It is necessary to connect the solution and prevention of problems related to humanity and its way of life with the processes of geographical education. Many problems were identified during the survey. In addition, the analysis of the sequence of tasks and the presentation of the information provided in the textbooks was carried out. The course of additions to the sequence of tasks using digital resources was studied. The education system is going through a period of profound changes caused by the rapid development of digital innovation. Recently, special attention has been paid to the use of effective teaching methods and techniques to achieve the planned results of the educational process. The relevance of the study was determined by the Sustainable Development Goal and based on domestic and foreign literature, and the results of the test work carried out using digital resources were determined. It is proposed that the senior class can be used in the teaching of geography and higher educational institutions within the framework of any topic. The use of digital tools in creating tasks for teaching geography enhances mutual understanding between teachers and students, fosters collaboration in the learning process, and improves the effective assimilation of material. It supports the development of a cohesive knowledge system, promotes the ability to work effectively with information, and aids in understanding the laws governing geographical phenomena in nature and the environment. This approach not only raises the quality of education but also enhances students' communication skills

and increases their motivation to engage with geography.

The sphere that forms a virtuous attitude, value, and consciousness in the younger generation is education. Nature-based solutions, apart from the educational process, are closely linked to global environmental, social, and economic problems (Iksan et al., 2020). Global issues, such as climate change, and biodiversity loss to prevent and reduce the knowledge of students about nature management is relevant today (Awewomom et al., 2024). It is common for attempts to change the environment to turn into environmental problems. Therefore, it is necessary to direct society to the efficient use of nature, prioritizing environmental tasks, and influencing young people's attitudes and behavior (Linhares & Reis, 2023). An important component of nature, a huge natural element is freshwater sources (Medeu et al., 2016). The researchers note that in recent years, the intensity of the use of freshwater by mankind has begun to increase. We can name the Sustainable Development Goals (SDGs), which were created for the effective use of Natural Resources and the solution of global problems, as well as for the protection and prosperity of the Earth. One of the main directions of Sustainable Development Goals is the planet, that is, the rational use of land ecosystems and Water Resources, Climate Change (Sustainable development goals, internet resources). For the 15th Sustainable Development Goal, the importance of efforts to preserve, protect, and restore terrestrial ecosystems is identified.

In the course of school geography in the textbooks of the 10th and 11th grades of the standard curriculum in secondary education (typical curriculum, internet resource) in the section «Nature Management and Geoecology» in the natural-mathematical (Tolepbekova et al., 2019; Kaimuldinova et al., 2020) and social-humanitarian direction (Kaimuldinova et al., 2019; Kaimuldinova et al., 2020). In the natural-mathematical and social-humanitarian areas of the 10th grade, the lessons on the topics «Types of Nature Management», «Assessment of the Impact of Types of Nature Management on the Environment», «Principles of Effective Nature Management», in the natural-mathematical and social-humanitarian areas of the 11th grade, «Regulation of the process of Nature Management», «Management of the process of nature management in the economic and consumer spheres» are analyzed. The department works on the concepts of geographical environment, nature Management, Environment, Sustainable Development, Environmental Management, resource availability, and natural landscape, among others. The purpose of our research work is to provide effective ways of teaching with the help of digital resources, in addition to studying environmental management activities.

There are several approaches to the classification of types of nature management. They are closely related to each other, as they arise based on corresponding natural complexes.

The integrity of the image of nature management it is worth highlighting the transport and communication, of Water Reclamation Distribution Services, which combine the above-mentioned types of nature management into a single framework and give special importance to their spatial location. In the following contexts, the Russian engineer-physicist Zvorykin (1993) developed a classification in which he identified four main types of Environmental Management: Industrial, Spatial linker, Municipal, and Environmental.

According to the classification of the author of many works in the field of nature management, Doctor of Geographical Sciences Evseev (2004), it is divided into Background, Large-Focus, Focal, and Dispersion Environmental use.

Among the presented in research, the activities of water protection, water transport, and territorial nature management clarify the relevance of our research work. In addition, the formation of lakes in the country and attempts to use them are of great importance. The use and management of nature are presented in several contexts about water resources, which are important by type. Among the most important causes of environmental problems

is the excessive consumption of Natural Resources. Water is an indispensable natural resource for human life and existence. To make conscious use of water as a whole society and make it sustainable, it is necessary to be aware of Water Information. 97.5% of the available water is found in the oceans and seas as salt water and 2.5% as fresh water in rivers, lakes, groundwater, and glaciers. Since 30.1% of fresh water is in groundwater and 0.4% is surface and atmospheric water, it is impossible to easily access and use, and water resources are significantly limited (Er, 2023). Musabaeva and Abieva (2003) in their works formulated that the increase in the Types of Nature Management, as it occurs under the influence of human economic activity, leads to changes in natural complexes due to their importance for the life of mankind, calling for the frequent occurrence of pollution phenomena in water flows and the implementation of environmental educational work as a solution (Musabaeva & Abieva, 2023). In solving emerging problems in nature management, there are also opinions about the reduction of agricultural land and production facilities located in the water area (Jasinskij et al., 2019).

As a result of human attempts to dominate nature and make nature their good, the advancement of Science and technology has turned into environmental issues such as climate change. This is the biggest threat facing the biosphere in modern times. The most important substance associated with climate change is water, because climate change affects the water cycle, and the water cycle affects the climate. As a result of this interaction, issues related to water resources, energy, food, health, and biodiversity arise for humans. More than two-thirds of the globe is occupied by water. The continent covers 29% of the Earth's surface. Water is very important for the continuation of human existence (Dikmenli et al., 2024).

The impact of human activity on lake ecosystems has varied significantly over time. Initially, the use of lake resources and human influence on natural complexes were minimal, primarily limited to fishing. As agriculture and animal husbandry developed, economic activity around lakes intensified, leading to practices such as deforestation and more extensive agricultural use. By the late 18th to early 20th centuries, the expansion of highly developed agriculture and large-scale land use was in full swing. This was followed by industrial activities, hydraulic engineering projects, and the growth of settlements around lakes. Over time, lakes became essential for water supply, irrigation, fishing, and fish farming (Vlasov, 1999). Most of the world's water consumption is used for economic needs. When assessing water consumption, it is necessary to distinguish two concepts: total and irrevocable water consumption. While total water consumption refers to the volume of freshwater taken from water bodies, non – non-refundable water consumption is the difference between the volume of water taken and the volume of water returned. According to scientists ' estimates and forecasts of water consumption indicators, the increase in the population leads to an increase in the indicator of water use (communal) (Table 1).

Table 1. *Indicators of water consumption in the world by sectors of the economy*

Description	Rating								Forecast			
									A		B	
	1900	1940	1950	1960	1970	1980	1990	2000	2010	2025	2010	2025
Population, million.	-	-	2542	3029	3603	4410	5285	6181	7113	7877	7113	7877
Area of irrigated land, million. hectares	47,3	75,9	101	142	169	148	243	264	288	329	286	306
Water consumption, km.cube / year	513 321	895 586	1080 722	1481 1005	1743 1186	2112 1445	2425 1691	2605 1834	2817 1987	3189 2252	2646 1867	2535 1793

communal	21,5	58,9	86,7	118	160	219	305	384	472	607	422	456
	4,61	12,5	16,7	20,6	28,5	38,3	45,0	52,8	60,8	74,1	61,0	63,0
industrial	43,7	127	204	339	547	713	735	776	908	1170	731	673
	4,81	11,9	19,1	30,6	51,0	70,9	78,8	87,9	117	169	97,0	225
reservoirs	0,30	7,00	11,1	30,2	76,1	131	167	208	235	269	208	275
total (rounded value)	579	1088	1382	1968	2526	3175	3633	3973	4431	5235	4006	3889
	331	617	768	1086	1341	1686	1982	2182	2399	2764	2233	2194

Shiklomanov (2020) who made a forecast assessment of changes in water consumption in the world for 2010-2025, concluded that in two versions: «A» - it is assumed that the growth of water consumption in the world will be the same as in previous decades, while «B» – (sustainable development) Along with the population until 2025 (8 billion. 122 million. 565 thousand people) the number of irrigated land and the volume of water consumption is projected to increase (Statistical portal, Mihailov & Dobroliubov, 2017). Many water bodies in the country are often used for consumption, depending on the sectors of the economy. For example, the chemical composition of the waters of the Tobol River Basin has changed under the influence of natural and anthropogenic factors. The composition of rocks, the variety of properties, the presence of soils and karst, and the difference in the degree of natural flow regulation are influenced by factors. Given the specific geological conditions, it should be noted that the Tobol River is natural waters. This area is characterized by a high content of heavy metals. The water form originates from the height of the Ural plateau on the borders of the country of Kazakhstan (west of Kostanay region) and the Russian Federation (East of Orenburg region). Many large industrial centers have been built on the banks of the river, and the water source is also used for the production of the metallurgical industry, mechanical engineering, petrochemical, mining, food, light, and other industries, electricity.

Alongside industrial development, agriculture, particularly irrigated farming, has also expanded significantly (Kozlova, 2024). The most substantial changes in river flow have been driven by economic activities in southern Kazakhstan. Domestic scientists have noted that anthropogenic activities in central and northern regions lead to a reduction in river water levels (Dostai et al., 2012). To address this, it is essential to incorporate lessons on water conservation into education, emphasizing environmental literacy and responsible water use. As society evolves, fostering an understanding of the sustainable use and preservation of natural resources is crucial. Additionally, cultivating environmental awareness and a sense of duty toward the homeland should be key educational goals, instilling patriotism and civic responsibility in students. As high school students are future professionals, educators must provide high-quality, well-rounded education, using thoughtful approaches to prepare them for responsible citizenship and environmental stewardship.

Digital technologies are developing at a high speed, storing unlimited data, which is an indispensable requirement for humanity in the acquisition of knowledge (Ozerbas, 2021). The process of digital transformation has already taken place in almost all sectors (Azevedo & Almeida, 2021). In the modern digital learning system, the teacher is a mentor, organizer, professional consultant, and knowledge expert (Tatarinov & Orlova, 2020). In geography lessons, we can offer several teaching methods related to the topics of nature management. For example, in *project-based learning,* learners work on specific projects related to the management of Natural Resources; This may include the development of solutions to improve sustainability, restore ecosystems, or implement sustainable practices (Masdarini et al., 2024). *Role-playing games in learning* help

learners understand complex natural resource management systems. For example, they can assume the roles of various stakeholders, such as government, business, and local communities, to negotiate and find compromise solutions. Thus, they can make common decisions and achieve the learning goal (Ruiz-Ezquerro, 2021). *Multimedia resources*, using videos, podcasts, and interactive maps to highlight environmental management issues and success stories can make the material more accessible and interesting (Lytovchenko et al., 2021). *Interdisciplinary courses* combine knowledge from biology, ecology, economics, and sociology to study environmental management. This helps learners see the complexity and interconnection of ecological systems (Chu & Waite, 2023). *Field research and excursions*: Organization of excursions to study local ecosystems, as well as identify problems and opportunities for their protection and Restoration (Bueno, 2023). *Case Discussion*: Analysis of real-life situations of successful or unsuccessful Environmental Management helps students understand practical aspects and apply theoretical knowledge in practice (Pinnelli & Chrystall, 2023). *Use of technology*: the introduction of geographic information systems (GIS), drones, and other technologies for the study and monitoring of Natural Resources (Al-Labadi & Sant, 2021; Fangqi et al., 2023; Wani et al., 2024). *Practical training:* involving students in volunteer projects or internships in environmental organizations (Cam, 2023). *Environmental monitoring*: learners can participate in the collection of environmental data, which helps develop data analysis and interpretation skills (Keskin et al., 2020). *Teamwork and discussion* create conditions for discussing different approaches and approaches to environmental management that develop critical thinking and the ability to work in a team. The methods help students better understand the principles of sustainable environmental management and develop the skills necessary to solve current environmental problems (Gomez-Lanier, 2018). Of the above methods, we used the use of multimedia resources and methods of teamwork and discussion in our research.

Materials and methods. Based on the results of the analysis of the information and data presented in the study, teachers were interviewed to clarify several issues related to the study of Environmental Management using digital resources. The quantitative and descriptive results of the survey were analyzed. Depending on the relevance of the research topic in identifying identified problems and solutions, digital platform applications and models were presented. In the course of the study of the analysis of approaches to teaching the topic «Types of Nature Management», which is important based on the analyzed literature, research was carried out on tasks in textbooks. It was proposed to use a digital platform in the process of mastering a new lesson, which has become more relevant, adding additional tasks and approaches.

The answers to the questionnaire were sent by geography teachers in Almaty, Turkestan, and Kyzylorda regions of the country (n=108). The answers to the survey questions are depicted (Tables 2,3,4,5).

Table 2. *The answers to the survey questions*

What type is your comprehensive school where you work?

		N	%
Valid	Rural school	85	78,7
	City School	23	21,3

Note: n=108

The geography teachers who answered the survey questions were offered descriptive calculations, and the publisher and authors of the geography textbook used in general education schools were known.

Table 3. *The answers to the survey questions*

Mark the authors and publisher of the geography 10th-grade textbook used in the school

		N	%
Valid	K. Kaymuldinova, S. Abilmazhinova. «Mektep» Publishing house	89	82,4
	S.Q. Tolepbekova, A.I. Amanzholova, A.M. Zhylkaidarova. «Almatykitap» Publishing house	19	17,6

Note: n=108

It was found that the 10th-grade Geography textbook, published by the publishing house «Mektep», compiled by the authors Kaimuldinova et al., (2019) is used by 82.4% of teachers, the 10th-grade Geography textbook, published by the publishing house «Almatykitap», compiled by the authors Tulepbekova et al., (2019) is used by 17.6%.

Table 4. *The answers to the survey questions*

Do you often use modern technologies in geography lessons?

		N	%
Valid	low importance	2	1,9
	average importance	26	24,1
	high importance	80	74

Note: n=108

From the answers to the survey of respondents, the quantitative statistics of teachers using modern technologies in geography lessons are evident. 2 teachers (1.9%) noted the low importance of modern technologies for geography lessons, and 26 teachers (24.1%) determined the average answer. The remaining 80 teachers (74%) noted that they often use modern technologies.

Table 5. *The answers to the survey questions*

How do you combine experimental work on the topic «types of Nature management» in a geography lesson?

		N	%
Valid	engage in scientific research	28	25,9
	laboratory work	8	7,4
	travel to nature	72	66,7

Note: n=108

Due to the relevance of the research topic, the organization of practical work by teachers on the topic «Types of Nature Use» was analyzed in the analysis of quantitative statistical information of survey responses. In this regard, 28 teachers (25.9%) indicate that they give directions to engage in scientific research, 8 teachers (7.4%) do laboratory work, and 72 teachers (66.7%) say that they achieve the goal of the lesson through nature trips.

In the course of the research, the main problems were encountered. «How do you draw students' attention to the topic of «Use of natural resources»?.»They answered the question as follows: *«using video materials and photos, statistics; use of nature while raising environmental issues; through practical work, to make students understand that the place of nature is important for human life; videos; through visualization; using statistical data;*

with visuals; through additional information, gamification, group work; according to the map; connecting the topic with the environment; explaining that it is not just something written in a book, but a process that is happening now; by connecting with life; I show the role of natural resources; by using simple life examples; by showing videos about resources and how to use them; conservation of natural resources, recycling, use of new technologies; learn and apply new methods of using natural resources; by asking problematic questions; through visuals; simple use of the importance of nature, the richness of that nature; If a person does not use natural resources sparingly, the future will not be important, so I draw attention to the sparing use of nature to keep the balance; I draw their attention by giving an example of its use in life; through a digital program;» and other variants are often encountered.

Respondents asked «What Internet resources, digital platforms, educational sites do you use in your lessons?» to the question they answered: *www.geoman.ru; www.globalforestwatch.org; geo-site.ru; word wall; planet earth; smart college, bilimland; google maps, seterra, Mozaik3d.com - 3D illustrations; Kahoot quizzes; NISLab, ChatGPT, Google Earth, Landsat; Natgeo, stat.gov.kz, Youtube; Gamma. ap, quiz, flipping, learning apps; visuals Twig-bilim, Wikipedia, Daryn.online, Pictochart. com; arcgis.com; Kundelik.kz»*

In the teaching of the topics of the «Usage of Nature and Geoecology» department, which is the relevance of the research work, the importance of conventional signs presented in the sequence of tasks found in the geography textbook is shown individually. Based on the requirements of using each type of task and the importance of the student's activities in achieving the lesson goals, the types of tasks found and not found on the topic were analyzed. In addition, efforts were planned to supplement the missing tasks with digital applications. In this regard, a survey was also received from the respondents related to this research problem. All types of tasks found in the 10th-grade Geography textbook are presented in the answer versions. What tasks (in the textbook) can be transformed by the system of digital platforms in teaching the topics of the «Usage of Nature and Geoecology» section?» A special graphic expression was made according to the answers to the question.

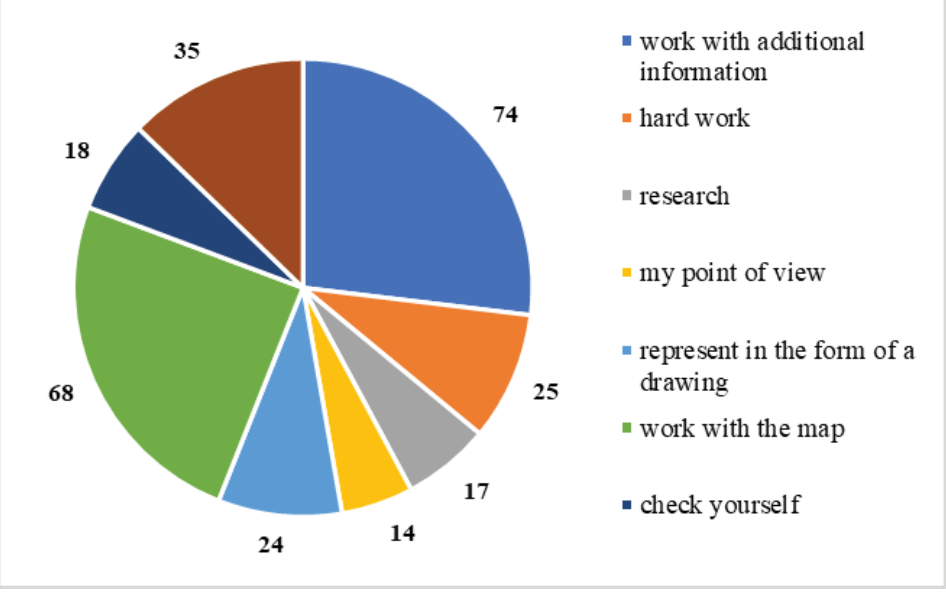

Figure 1: Indicator of multiple-choice responses to a survey question

The results are calculated by marking the answers to the survey question in Figure 1 as multiple-choice answers. The highest indicator showed «working with maps» (68) and «working with additional information» (74). Therefore, it is concluded that the types and

methods of tasks in the two versions shown by a high indicated can be transformed with the help of digital resources. At the same time, «my point of view» (14), «research» (17), and «check yourself» (18) answers showed a relatively small value. However, a low score does not mean that it is not necessary to work within the given topic with digital resources, looking at the identified answers. Due to the relevance of the research work, it is necessary to demonstrate the possibilities and effectiveness of using digital resources on the proposed topic. The survey questions asked about the problems encountered in teaching the topics of the «Usage of nature and geoecology» section (Table 6).

Table 6. *The answers to the survey questions*

What are the problems in teaching the topics of the «Usage of Nature and Geoecology» department?

	N	%
other issues	4	3,7
low availability of resources	40	37,0
lack of time	19	17,6
lack of digital resource tools	45	41,7

Note: n=108

45 teachers (41.7%) stated that there is often a lack of digital resource tools when identifying the problems encountered in teaching the subjects of the «Usage of Nature and Geoecology» department. In addition, 19 teachers (17.6%) proved that the problem of lack of time hinders the achievement of the learning goal on the proposed topic, while 40 teachers (37%) noted the lack of availability of educational resources. 4 teachers (3.7%) have identified that other problems occur. It is normal that many problems still occur in the education system. However, it would be possible to reduce the problems if attention was paid to the development of teaching methods and educational activities to find ways to solve the problems.

Results. In the 10th-grade geography textbook for the natural science-mathematics direction, the lesson topics and learning objectives of the «Usage of Nature and Geoecology» section in the chapter «Usage of Nature» are: *Types of nature use* - 10.3.1.1. explain the need to use nature, identify types (from the economic point of view), and present them graphically; *Assessment of the impact of nature use on the environment* - 10.3.1.2. Determining and evaluating the environmental impact of the types of nature use (on the basis of the local, regional component); 10.3.1.3 Suggest ways to reduce the negative impact of nature use on the environment (on the basis of the local, regional component); *Principles of efficient use of nature* - 10.3.1.4.Determination of the principles of efficient use of nature; 10.3.1.5. Development of proposals for increasing the efficiency of nature use (on the basis of the local, regional component). Concepts in topics: environment, resource supply, secondary nature, use of nature, geographical environment. The information in the textbook began with explanatory information on general terms. There are thought-provoking questions and interesting information in the texts.

The number of symbols containing the tasks given in the textbook is 8. All symbols describe the actions performed in their way. In addition, each conditional sign has its features and significance, depending on the complexity, number, level of information, and tasks presented. It is known that in the process of implementation, the student develops research, control, qualification, search abilities, and skills.

Each lesson offers a new stage. The reaction of teachers is caused by dynamic, constantly changing classroom situations (Maatta et al., 2021), and the fact that tasks are carried out in high-quality ways during the lesson brings positive results. *Figure 2 clearly shows attempts to use the help of digital resources to provide a new approach to the location of tasks that are not found on the topic in the research work.*

Educational materials play an important role in the formation of skills in general social studies. Educational material can be defined as a set of materials consisting of theory and practice. The teaching material consists of information data, and teaching approaches (Suryani et al.,2021). It is important to apply theoretical knowledge in practice, but tasks that develop skills in the process of mastering new lessons for students can also be performed using modern approaches. A suitable program for introducing processes in natural complexes: Mozaweb.com 3D technology platform. It is important to master the visual representation of the process of nature management. Wave power plants on the platform show the scheme of daily fluctuations in the water level for the production of electricity in the order of the natural process. The use of digital platforms is an important process in the modern education system. In current teaching, digital technologies are often used and digital technologies include applications that provide electronic capabilities.

With the help of the platform, the student can easily answer questions that develop logical tasks and research abilities. In addition, the student's visual thinking will increase. The platform shows how the attempt to use the natural process of daily water fluctuations in obtaining electricity is fully realized. Entering the platform and working with resources is free. By registering with a personal email address, each student can easily and quickly enjoy the processes of any nature.

Given by Mozaweb.com, the start page of the 3D technology platform contains 3D views in all subject areas available to teachers and students. You can filter depending on the subject of study and depending on the subject area. In addition, an explanation of all natural processes is shown. After entering a special site, the mylearn button displays the personal data of the registered person, the directories they have worked with, and the statistics of their actions on the platform. Next in the «library» button is a collection of different exercises. For example, there are 3D scenes, tools and games (Figure 2), quizzes, video drawings and dictionaries, video clips, 3D encyclopedias, audio, digital lessons, books, and textbooks.

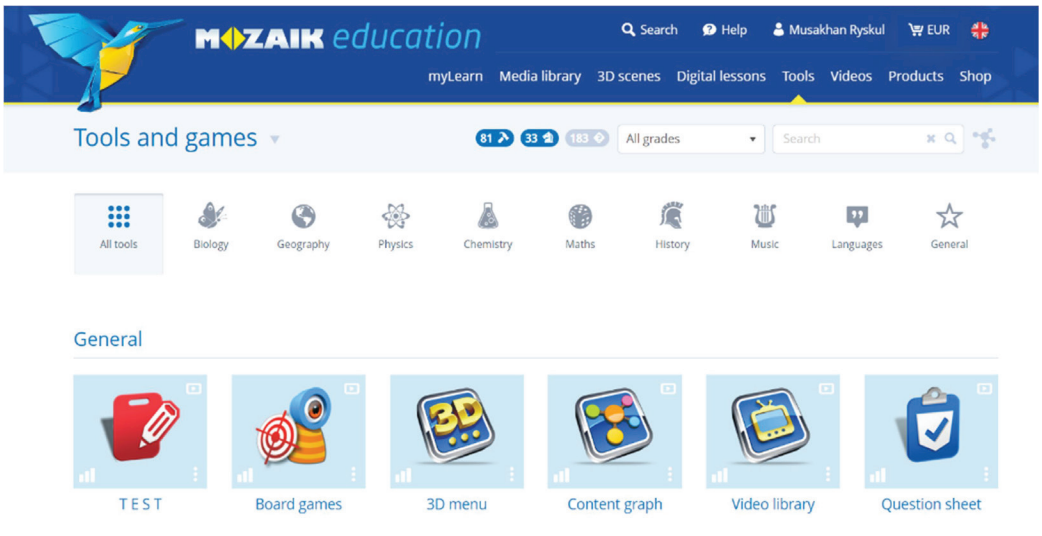

Figure 2: Toolbox and games window on the» Media library « button

By clicking on the next button «3D scenes», the student will be able to fully orient the object of study in the subject areas in 360°online 3D format. Develops visualization abilities, looking at the process of using a natural resource related to the topics of nature management and management. The next Assistant button «Digital lessons» contains important information from one lesson in full, theoretical, and practical work. Therefore, the teacher can fully use this tool in the course of general classes. Some functions require paid registration. The «Tools»

button is used to use tools that are necessary in any part of the lesson. There are a bunch of methods that include entertainment tasks in all subjects. In addition, the platform's products button contains apps provided by the app company. For example, mozaweb, euler3D, mozaLog, marker, Euclid, and for students, the mozabook tablet, Laboratory camera, physics, Matek, and 3D encyclopedia applications will work. The conditional sign «practice work» in an unfulfilled task in our research problem, which has become relevant, can be implemented using the «Tools» button.

It is useful for the teacher to use the capabilities of the auxiliary buttons «Tools», «3D scenes» and «Digital lessons» to perform tasks indicating the symbol in the textbook called «Explore». Task actions «working with the map» can be viewed on the platform by subject areas and on the topic on the map of any object in The Shape of a Globe and cylinder. In the process of mastering a new lesson on the topic «Types of Nature Management», Mozaweb.com the 3D technology platform has many opportunities for updating tasks and teaching methods that require visualization of processes such as an overview of any natural objects of the Earth's surface, natural complexes and their interaction with humanity, efficient use and management of Natural Resources. The capabilities of this platform, which will be used in any section of the new lesson that will be conducted, are sufficiently covered within the entire discipline.

It is beneficial to use the learning process carried out in the education of digital resources, which is an indicator of achieving optimal learning outcomes.

Discussion. As a new stage in the development of mankind, the period of transition to digital resources has begun. In many areas of public life, including education, the main change is taking place. The issues of developing a methodology for the use of digital resources, principles, and rules of teaching in a digital environment, and revising optimal methods of digital learning in education also arise (Puniatmaja et al., 2024). In the process of practicing each statement, there can be no problems. However, the solution to the identified problems must be also corrected in time. In the course of the experiment on the 3D technology platform of Mozaweb.com, along with effective points, obstacles were encountered. Effective points – registration is not difficult; convenient to use in the classroom; test, quiz and any other interactive task is created; visual memory; increase interest; assistant in carrying out research activities; Obstacles - a reliable internet source is required; only the first five lessons are free, after that there is a fee; It is inconvenient for individual and group lessons, but each student can register with his own page; a projector and an electronic board are mandatory.

It is easy to register on the 3D technology platform of Mozaweb.com. It is effective to use in the classroom. In individual, pair, and group work activities, it is difficult to navigate multiple objects that are not used by each student with their tool, because only five tests can be performed in the free version of the platform. It is mandatory to have a projector and an electronic board in the classroom. General Mozaweb.com the 3D technology platform develops students' visual memory, interest, as well as comprehensive search abilities and skills in performing research activities.

It has been compared to several studies in teaching environmental management and management activities. In the course of the analysis, it was concluded that the result of all nature management actions led to environmental, and global problems. The increase in the world's population leads to an endless increase in the demand for Natural Resources since the desire of a person to live comfortably prevails. This action entails an increase in production. In achieving a high level of industrial development, competition increases, the activities of which, in addition to the consequences for human health, pave the way for environmental destruction. This creates pollution problems that upset the balance of life and exacerbate the dangerous effects of global warming (Ali et al., 2023). In addressing environmental issues, many countries are conducting research and seeking solutions for preserving natural resources. However, a more sustainable approach involves educating people from a young age about the impact of

environmental problems and the importance of nature conservation. A prime example is Thailand's «Green Classroom Project», launched by the Electricity Generating Authority of Thailand in 1993. This program promotes environmental awareness by integrating comprehensive education across various subjects while enhancing students' communication skills. Focused on electricity and energy conservation, it fosters a culture of resource-saving among Thai youth. The project, which continues today, strengthens students' learning processes, self-concept, and teamwork through group-based research activities (Punatung, 2022).

The following similar studies examined approaches that taught the flora and fauna that are an important part of natural complexes and the importance of the natural reserves in which they live. The study emphasizes local biodiversity, incorporating it into educational programs at all grade levels. Natural science curricula include detailed information about the species and ecosystems within nearby nature reserves. Necessary permits were secured from both educational authorities and nature reserve administrations, allowing for the collection of comprehensive data and resources related to these protected areas. Research efforts were analyzed and evaluated to see how they could use the resources. In addition, attempts to turn flora and fauna into the main source of natural reserves and ways of its protection and conservation activities into educational material are identified. The methods used in this study are interviews, photo and video identification, and document analysis. As a result, studying the Wildlife Sanctuary as a teaching tool, proved that teaching the subject of natural science has great potential. Students learn in depth the concepts of natural complex, Living Things, ecosystems, flora and fauna, biodiversity, and evolution (Tupas, 2019).

In addition, several works on the process of teaching natural sciences with the help of digital resources were analyzed. For many people, digital transformation provides an excellent opportunity to keep up with the demands of this time, as digital transformation affects every part of human life, we find that it is important in many areas of social science, including education. Therefore, the study examines the research carried out on digital transformation from an educational point of view, using data retrieval and analysis techniques. Digital transformation is not just a process in which we decorate the relevant ecosystem, rather, it is a change that involves strengthening and presenting the ecosystem with digital processes (Bozkurt & Sharma, 2022). In the next study, the methodology of teaching natural science according to the Kolb model showed that practical work prevails in the acquisition of theoretical knowledge. The materials of the work proved that it can be useful for obtaining theoretical and practical knowledge about the use of the Kolb model in the methodology of teaching Natural Sciences in the initial training of students, as well as for integrating this model into the initial training program of students (Mocinic et al., 2020). Consequently, most studies involve the consideration of all ways of practical implementation of theoretical knowledge in scientific works related to the use and management of nature. Practical work is easily mastered in any geographical lesson, compiled using digital resources by the results of our research.

Conclusion. The main aspects of modern education are didactic tools, teaching approaches, and digital resources. In addition to the formation of geographical knowledge, High School students should be guided by personal self-development and activity in society, given that they are future professionals. At the same time, as an element of natural complexes, it is important to create conditions for close contact with the environment and strong communication with other people in society, the development of environmental literacy. The main issues that became relevant in the research work were identified in the analysis of information and domestic and foreign works by the fifteenth goal of sustainable development. The main attention was paid to the provision of information on the training program of the 10th grade of Environmental Management and management activities.

In the study, an analysis of the given sequence of tasks in the textbook was carried out. As a result, comprehensive research was

carried out on the platform, which is performed using a digital resource as a complement to the tasks. The possibilities of the platform used in training have been identified. Several similar scientific papers were compared and the main attention was paid to the approaches and results of the study. The proposed platform can be used within the framework of any topics related to the subject of geography of the senior class and in higher educational institutions.

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IRSTI 14.25.09 10.51889/2960-1649.2024.61.4.007

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THE PSYCHO-PEDAGOGICAL ASPECTS OF TEACHING OF RHETORIC IN GRADES 8-9 OF A SECONDARY SCHOOL

Abstract

This research investigates the psycho-pedagogical aspects of teaching the art of rhetoric to adolescents in grades 8-9, focusing on students aged 13-16. Recognizing the unique developmental characteristics of this age group, the study aims to identify key criteria informed by psychological principles that can enhance instructional practices. Specifically, the research seeks to understand how factors such as the desire for independence, increased peer interactions, and the quest for identity influence the effectiveness of rhetoric education. By developing a comprehensive framework based on these characteristics, the study emphasizes the importance of adapting teaching methods to align with the cognitive and social needs of adolescents. To gather insights, a survey was administered to 54 students, equally divided between grades 8 and 9, using eight carefully crafted questions that reflect the identified criteria. The results will be analysed to determine the extent to which students' responses align with the proposed socio-psychological characteristics. This analysis aims to shed light on the significance of rhetoric education in promoting critical thinking, self-expression, and interpersonal skills among adolescents. Ultimately, the findings are expected to inform the development of elective courses that not only foster rhetorical abilities but also support students' overall personal and social growth, creating a more engaging and relevant educational experience.

Keywords: psycho-pedagogical aspects, adolescents, age characteristics, grades 8-9, the Art of Rhetoric.

Introduction. All subjects should be taught in accordance with the age of the students.The state mandatory standard of basic secondary education is also aimed at ensuring the gradual deepening of subject knowledge and skills by stages, considering pupils' age characteristics. The saying of sages: "Treat your son like your king until he is five years old, regard him as your servant until he is fifteen years old, and after fifteen years, consider him to be your friend"

Matyzhanov, (2023) indicates that appropriate education is given to the child adapted to his age.

In psychology, the term "age" means the period of human development (Zharyqbaev & Sangylbaev, 2011; Bekchanova, 2023). The characteristics of age are considered the laws of development according to a person's age (Zharyqbaev & Sangylbaev, 2011). Correspondingly, developmental psychology helps to recognize the mental development of a person and the laws of formation in the breath of life. One part of developmental psychology is the mental development of the adolescent and the formation of his personality (Zharyqbaev & Sangylbaev, 2011; Abd El Salam et al., 2023).

The 8th-9th grade pupils of secondary schools are persons usually aged between 13-16 years. "Zhetkinshek" is a term given to a person aged 13-16, depending on age (Zharyqbaev & Sangylbaev, 2011). In folk wisdom that has been preserved and has reached today, this age period is considered a special period. For example, "Er bala – on ushte otaw iyesi" (that is, a boy is the head of the family at thirteen), "On ushte ul – ulan, On beste – qyz ulan" (that is, a boy is a growing person at thirteen, a girl is a growing person at fifteen), "Bolar adam on besinde bas bolar, bolmaityn adam otyz besinde zhas bolar" (that is, there is a person who become a head at fifteen, there is a person who remain a child at thirty-five) (Keikin, 2023; Segizbaiuly, 2014). These proverbs explain that zhetkinshek is not a kid, but rather "a growing person", "head of a family" and accepted as an adult by people.

No project illustrates directly that a person has some kind of ability at a certain age and such a project is always found only through research and observation (Aimauytuly, 2023). Therefore, to teach any subject, including the Art of Rhetoric, it is necessary to determine the socio-psychological aspects of 13-16-year-old pupils according to their age.

This study aimed to categorise the features of adolescent students in grades 8–9 into categories according to psychologists' declarations and to poll teenagers to find out how important it is to teach students the art of rhetoric based on their age. Similarly, the following are three research questions that help determine the importance of teaching the Art of Rhetoric to members of the appropriate age group:

1. Which statements of psychologists regarding the age characteristics of adolescents can be taken as a criterion?

2. What can be the result of the survey conducted according to the selected criteria?

3. Is it important to teach the Art of Rhetoric to 8-9 grades including their social activities, behaviour, and abilities?

Materials and methods. For famous persons, their teenage years are similar to the building blocks of their personality development. Tole bi begins his path of being "bi" (by the Oxford Qazaq dictionary, the judge chosen by the people) at the age of fifteen (Dadebaev, 2016). Shal aqyn compares the words he uttered at the age of fifteen to fire and flames and compares himself to an eagle on a rock (Zharyqbaev & Sangylbaev, 2011). Qudaiberdiuly (2021) a poet and a follower of Abai, narrates his ten-to-fifteen-year-old attitudes, interests, and changes in his behaviour, clarifying that young Shakerim wanted to be different from others, to strive for creativity and to be free, to study science.

Adolescence is a period of transition from childhood to individuality. Adolescents want to communicate with their peers, to be independent, to separate themselves from adults, and they need other people to recognize their rights. That is why one of the first psychological signs of a certain period is considering themselves adults, the feeling of growing up (Bapaeva, 2014).

Adolescence is a period when various conflicting personalities often clash. Calling it "storm and attack" (Ibraimova & Ermentaeva, 2020), Hall (1904) shows 12 different conflicts in adolescent behavior: activity and fatiguability; cheerfulness and sadness; confidence and shyness; selfishness and sociableness; kindness and anger; verbosity and reticence; sensitivity and indifference; intelligence and thoughtlessness; desire for knowledge and passion for action; traditionalism and innovation; sense and mind; wisdom and folly.

Adolescents embark on a journey of self-exploration, making it crucial to consider their orientation and adjustment to adulthood (Rydell & Brocki, 2024). This phase of psychological development is pivotal for personality formation, as adolescents strive to understand their own identities (Ibraimova & Ermentaeva, 2020). They require a supportive environment that fosters this exploration (Mandel, 2015). During this time, both boys and girls begin to analyse themselves and others, often feeling that their thoughts, feelings, character, behaviour, and appearance are under scrutiny. In response to this perceived judgment, they may seek refuge in intellectualism, pursuing answers to abstract and philosophical questions. This process enhances their ability to think abstractly, formulate predictions, and evaluate outcomes.

As described above, the direction of thinking of adolescents changes from concrete to abstract thinking (Sanders, 2013). Piaget (2016) divides the development of child intelligence into three stages. The third stage covers the period from 11-12 to 14-15 years. Piaget (2016) calls the third period the formal operations period. At this stage, the act of thinking takes place without being based on visuals. Because adolescents can think abstractly, they are used to scientific thinking: the practice of making predictions and conclusions, and accepting other people's arguments, motives, and ideals (Kruchinin & Komarova 2016). Analyzing Piaget's (2016) statement, Menkiti (2009) names two cognitive abilities of adolescents: a) distinguishing "reality" from "possibility" and knowing what results can be achieved or not; b) thinking deeply and reporting on what one is thinking (Menkiti, 2009).

The social status and activities of adolescents change gradually and become closer to adult life (Gotlieb et al., 2024). Vygotsky (1929) notes two different trends of this change. In the first one, adaptation to adult life faces some obstacles, and in the second one, adaptation to adulthood is carried out normally. The former trend is affected by material dependence on parents and a lack of significant social activities and school lessons, while the latter trend is facilitated by the adolescent's feeling of being an adult, striving for independence, and acceleration (Kruchinin & Komarova 2016).

The adolescent period is a marginal period between two different cultures, specifically, the world of children and adults: the adolescent does not want to be a member of the children's culture, but cannot enter the society of adults either (Bapaeva, 2014). According to Vygotsky, (1929) one of the signs of this period is the creation of a life plan.

What should a teacher who teaches adolescents be like? Psychologists state that adolescents want to see sincerity, morality, and attentiveness from their teachers and they value these qualities highly (Katerinina, 2015). Therefore, it is better for the teacher to "propose morals rather than rules" to the young pupil (Zharyqbaev & Sangylbaev 2011; Xia et al., 2022). It is also important to remember that teachers and parents must maintain the best possible relationship with adolescents (Jaruseviciute et al., 2024; Esche & Böhnke, 2024).

A historical fact worth noting is that while studying the data related to the era of Kazakh adolescents before the October Revolution, noted two features characteristic of adolescents: one is a high level of listening ability, and the other is the ability to speak skilfully (Zharyqbaev & Sangylbaev 2011). Currently, it is important to develop the reproductive (listening and reading) and productive (speaking and writing) skills of pupils.

Adolescence is the period when the basic position and value of an individual are determined. In this period, the orientation of a person to value will play a key role (Zharyqbaev & Sangylbaev, 2011). Based on Spranger's (2019) statement "Personality according to value" defines six different types of personality (value), which are: economic person (thrift), aesthetic person (beauty), theoretical person (attentiveness), social person (sociability), political person (lust for power), and religious

person (religiousness). All of these values can be found in a person, but one of these values may weaken or strengthen the other, and one may hinder or help the other. However, the direction of a person's life could be determined based on only one guiding value.

Analysing the statements of the above-mentioned psychologists, the socio-psychological features of the 13-16-year-old pupils were classified into seven criteria that should be taken into account in teaching the Art of Rhetoric. According to these criteria, an adolescent:

- advances towards the adult group, therefore tries to be independent;
- often communicates with peers;
- he is looking for himself: he wants to find his place and function in society;
- analyses both himself and others, gets used to philosophical thinking (thinking deeply);
- the act of thinking takes place without being based on visuals;
- however, he accepts the opinions, motives, and ideals of others;
- switches to abstract, scientific thinking: makes predictions, checks them, makes conclusions.

Although the main methods of youth psychology are observation and experimentation, we thought it would be good to try how adolescents answer questionnaires prepared based on the criteria. The questionnaire consists of eight closed questions. The survey questions based on the criteria are as follows:

1. Who do you think you are: a kid or an adult?
2. Who would you like to talk to more?
3. Are you looking for a position in society or a profession?
4. "Who is a person?", "What should a person be?", "What should society be" Are you looking for answers to questions like?
5. Do you try to do something yourself or do you prefer to do based on visual aids?
6. Do you think like "If this is done like… then it will be like…"?
7. "Let your mind guide your words, not your tongue. Know what you are talking about. Know who you are talking to. Know where to speak. Know when to speak. Know how to speak." Do you agree?
8. Do you want to how to speak, to whom, where, and, when?

If the percentage of the answers to the questions is below 50, then it is assumed that compliance with the established criteria is at a low level (table 1). The percentages of middle and high levels are given in the table.

Table 1. *The correspondence level*

Percentage	Correspondence level
0-25%	Not corresponded
26-50%	Low level
51-75%	Middle level
76-100%	High level

The first question was asked to examine the pupils' transition from childhood to adulthood; the level of conformity was not taken into account. The last eighth question's purpose was not to clarify the characteristics of pupils by age, but to find out from which grade it is correct to start the teaching of public speaking, so the answers of the two grades were only compared.

Results. The survey was conducted in a secondary school named after A. Navoi N13. 54 pupils (27 pupils of the 8th grade and 27 pupils of the 9th grade) participated in the survey. During the survey, the purpose of the study was explained to the students: "Dear pupil! Try to answer the survey honestly. Because your valuable opinion is very important to us. You can refuse to participate in the survey." Therefore, pupils participated in the survey according to their wishes.

Table 2. *Results of the survey*

The questions	Answers are to be marked according to the criteria	Pupils of the 8th grade	Pupils of the 9th grade	Correspondence level	Average percentage
Who do you think you are: a kid or an adult?	– A kid	78%	44%	The correspondence level is ignored	61%
	– An adult	22%	56%	The correspondence level is ignored	39%
Who would you like to talk to more?	– With my neighbour friends. – With my friends	70%	67%	Middle/Middle	69%
Are you looking for a position in society, a profession?	– Yes	85%	93%	High/High	89%
"Who is a person?", "What should a person be?", "What should society be?" Are you looking for answers to questions like?	– Yes	63%	81%	Middle/high	72%
Do you try to do something yourself or do you prefer to do based on visual aids?	– I try to do it myself	81%	78%	High/High	80%
Do you think like "If this is done like… then it will be like…"?	– Yes	81%	93%	High/High	87%
"Let your mind guide your words, not your tongue. Know what you are talking about. Know who you are talking to. Know where to speak. Know when to speak. Know how to speak," Boltirik Sheshen said. Do you agree?	– Yes	100%	93%	High/High	97%
Do you want to how to speak, to whom, where, and, when?	– Yes	74%	52%	The correspondence level is ignored	63%

1. Who do you think you are: a kid or an adult? 78% of 8th graders and 44% of 9th graders consider themselves as kids, while 22% of 8th graders and 56% of 9th graders chose the answer "an adult" respectively (figure 1).

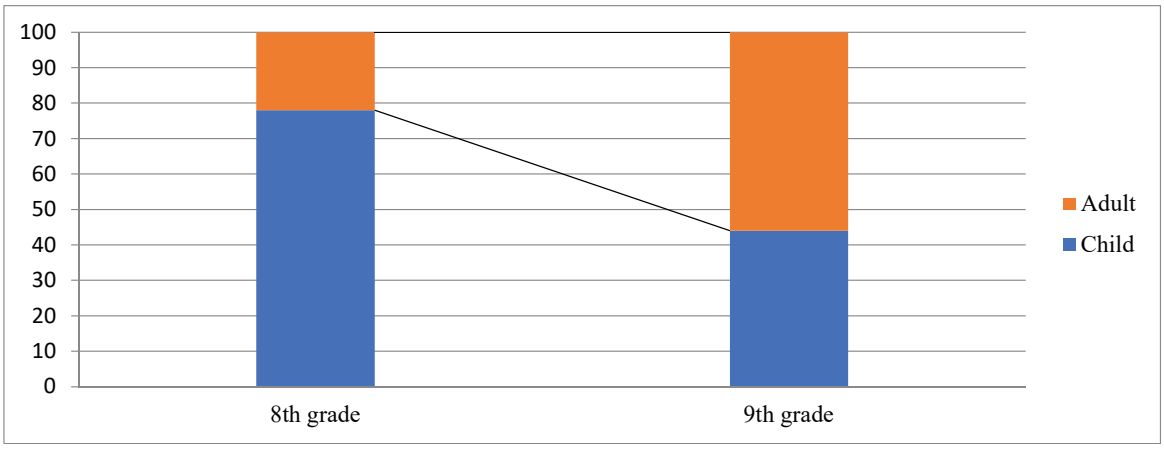

Figure 1: Kid or Adult (%)

In this case, as reasons for changing the answer from "kid" to "adult," two reasons can be mentioned. The first is the age difference. The total age difference between 9th graders and 8th graders is 1.2 years. This is a natural situation, that is, as a pupil grows up, he considers himself an adult. And the second reason may be the class the pupil is in. For example, all three 15-year-old pupils studying in the 8th grade marked the answer "child". Even a 14-year-old pupil in the 9th grade chose the answer "adult".

2. Who would you like to talk to more? 8th grade and 9th grade pupils indicated the desired answer almost equally (70% and 67% respectively): they mostly want to talk with their neighbour friends or friends. One of the pupils wrote "with God" as a friend, while another pupil wrote, "with no one". The correspondence level is middle. Why does an adolescent often want to communicate with peers? The reason for this may be that parents, relatives, or teachers still consider pupils as kids.

3. Are you looking for a position in society or a profession? 85% of 8th graders and 93% of 9th graders who took part in the survey answered "Yes". The level of correspondence between the answer and the statements of psychologists is high. This result shows that the implementation of elective courses could start in 8th grade according to the wishes of the pupils.

4. "Who is a person?", "What should a person be?", "What should society be" Are you looking for answers to questions like? We thought it would be better to illustrate it with a diagram because the level of conformity of the result to the statement is different (figure 2). The correspondence level is 63% in the 8th grade, while the result is higher in the 9th grade (81%).

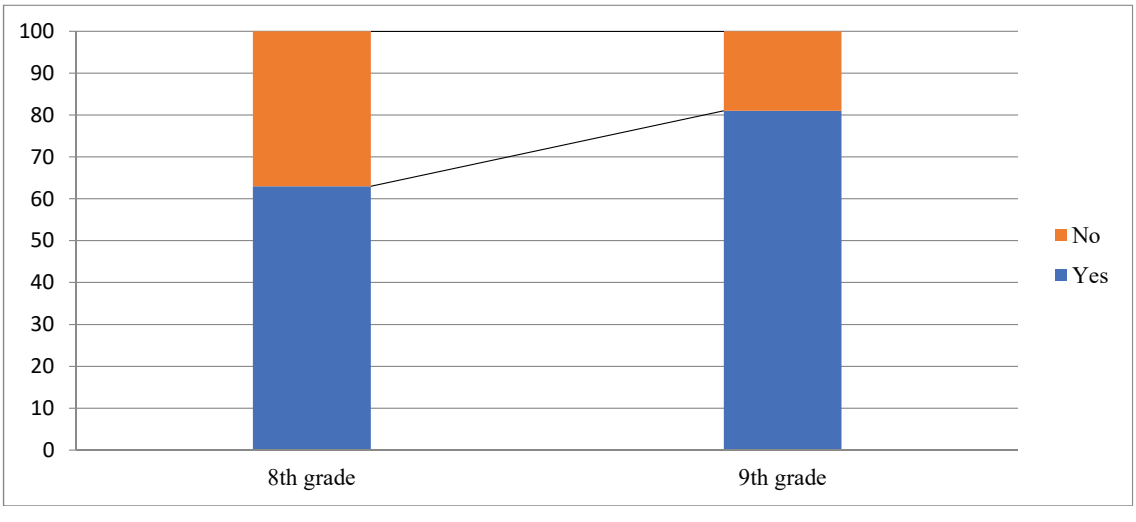

Figure 2: Philosophical thinking

5. Do you try to do something yourself or do you prefer to do based on visual aids? For most pupils (81% of the 8th grade, and 78% of the 9th grade respectively) it is better to try something by yourself without any example. Therefore, the level of compliance with the statement is also high.

6. Do you think like "If this is done like… then it will be like…"? Although the correspondence level is high in both classes, according to the diagram, the percentage increased by 12% in the 9th grade (figure 3).

7. "Let your mind guide your words, not your tongue. Know what you are talking about. Know who you are talking to. Know where to speak. Know when to speak. Know how to speak". Do you agree? The level of compliance with the statement "accepts the opinions, motives, and ideals of others" is high. However, even though all the pupils in the 8th grade accepted the saying of Boltirik Sheshen, the percentage decreased (93%) in the 9th grade.

In conclusion, these following statements of psychologists became important in teaching the Art of Rhetoric: an adolescent often communicates with peers (middle level); analyses both himself and others, gets used to philosophical thinking (middle level); he is

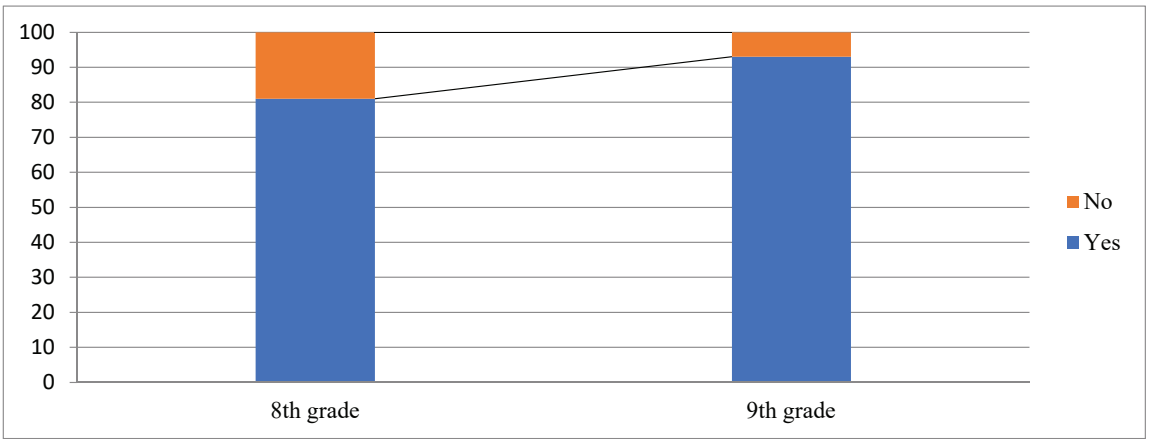

Figure 3: Abstract thinking

looking for himself: he wants to find his place and function in society (high level); switches to abstract, scientific thinking: makes predictions, checks them, makes conclusions (high level); accepts the opinions, motives and ideals of others (high level).

Discussion. Although it is not necessary to demand the Art of Rhetoric from anyone (Zharyqbaev & Sangylbaev, 2011), an adolescent needsto learn as much as possible about the theory of the Art of Rhetoric, to familiarize himself with the models of Rhetoric in the 8th grade, and in the 9th grade to develop the relevant skills.

Firstly, an adolescent wants adults to accept him also as an adult; he strives to prove that he has his point of view and his thoughts. The Art of Rhetoric teaches a pupil who wants others to consider him an adult what, when, where, and how to say or speak (Dadebaev, 2016). According to Hall (1904), since adolescence is characterized by both traditionalism and innovation, the pupil needs to master the appropriate use of both of these contradictions. For example, fifteen-year-old Tole was not satisfied with the judgment of the judges: "Oh, the good ones! White must be estimated as white!" he said. One of the judges: "Turn away from the son who talks even there is his father and turn away from the daughter who talks even there is his mother! Who is this boy?" he said. Then the young Tole answers according to the tradition: "Oh, my older brother, is not the owner of a family at thirteen? Am I guilty of being fifteen years old?". And young Qazybek says to Qontazhy: "By our custom, a man sits according to age, speaks according to his mouth". To the words of Malaisary "Turn away from the son who talks even there is his father and turn away from the daughter who talks even there is his mother!" Young Syrym answered innovatively: "If there is a father and a son talks, he is probably growing up, if there is a mother and a girl talk, then she is probably growing up" (Torequl, 2006).

Secondly, the Art of Rhetoric contributes to the development of skills of logical thinking and combining theory with the practice of an adolescent pupil who turns to think deeply, hypothetically, and scientifically. Since the Art of Rhetoric is connected with all branches of science and art (Dadebaev, 2016), this mentioned Art shows models of scientific thinking, testing theory with experience, which is necessary for a young pupil in all fields. For example, 13 or 14-year-old Senkibai with the permission of Tole Bi settles the following dispute: a Kyrgyz man accused a rich Kazakh horseman of killing his child in the cradle and came to demand blood price. According to the Kyrgyz, the rich man drove a herd of horses near the Kyrgyz yurt. The Kyrgyz claimed that the heart of the child in the cradle was stopped and the child died due to the loud noise of horses. Senkibai then said: "Let's milk a flock of sheep, boil the milk on a pot, and make curdled milk. The herd of horses that passed the Kyrgyz man's house should be ready," he said. The gathered people milked a flock of sheep and made curdled milk. When they opened a pot of thick milk, they saw that the thick cream was solid. Young Senkibai

ordered to drive the herd of horses near the house again. (The pot with curdled milk was closed). When the horses pass near the house, it is like the earth shakes. After the dust had settled, the gathered people opened the pot and saw that the elbow-thick cream of curdled milk was cracked in four places. Then Senkibai said: "The heart of a young child is not like thick cream? When a herd of horses passes, is not it a sign that it is broken in two parts? The rich man is guilty who drove horses over the village, not through God's wide land," he says (Torequl, 2006). We notice that this decision Senkibai is the result of abstract thinking, making predictions, and checking them.

Esei Bi tells the young generation: "Be deep in exhortation, be deaf to gossip. Do not take your grandfather's camel foal, but take his blessing." Thirdly, through the examples of Rhetoric, pupils perceive the judgment, motives, and ideals of intellectuals. Adolescents want to make decisions on their own like adults, but they need advice from adults. In this regard, it is better to give as examples the advice and blessings of Bi-Sheshens to followers and children. When young Tole wants to receive his father's blessing, before giving a blessing, his father explains the importance of unity with the example of a bundle of sticks (Torequl, 2006). And nine-year-old Zhetes asks exhortation that will not die and wear out, will not be forgotten, instead of a horse that will die and a coat that will wear out. Then Tole Bi blesses him to be the mind of many houses, the wise man of many countries, the brother of many warriors, to judge white as white and black as black (Torequl, 2006). Boltirik Sheshen "Do not say there is no enemy, under the cliff, do not say there is no wolf, under the hat. Own your head, own your hands, own your tongue," he said. But his son understands the meaning of his exhortation only after quarrelling with someone somewhere. Then Boltirik Sheshen explains "the enemy": "If it is stubborn, your character will attract enemies… If it is judgmental, your mind will attract enemies… If it is a critic, your demand will attract enemies… If it is insatiable, your eyes attract enemies… If it is inappropriate, your words will attract enemies." He said (Torequl, 2006). Boltirik Sheshen tells his son that the real enemy of a person is his behaviour.

An adolescent who is interested in adults' ingenuity, needs models of intellectualism. Tole Bi says: "Do not say he is young, if he is intelligent, then he is older" (Torequl. 2006). Therefore, fourthly, the Art of Rhetoric offers young pupils a golden treasure of ingenuity and improvisation. Let's give examples of Rhetoric. "Are we older or are you older?" To that question, Young Edil replied: "If we add the ages of the ninety children standing here, who is older if we are not older?" (Torequl, 2006) To Malaisary's words, "A big son was born from a bad person who even cannot feed sheep, probably it will be you?" young Syrym answered: "Yes, he is me. But people used to say that from one bunch of firewood will be made a statue…" "There are three types of old men: a troublesome old man, a disrespectful old man, and an old man walking house by house. Which one are you?" he asked a counter-question. Knowing that Syrym came to be blessed, Malaisary who was impressed by his ingenuity, said: "A young who can be a man has a business with a man…", wishing him to be a righteous and famous man, he blessed him (Torequl, 2006). When Dosai Bi was young, his father asked him, "Is the king bigger or the farmer?" "Of course, the farmer is bigger. If the farmer does not give grain, won't the king die of hunger?" he answered.

Since Rhetoric is an Art based on truth, it is very important for a creative pupil who has mastered Rhetoric to become an honest citizen who does not pursue personal interests and serves for the sake of society. According to the state mandatory standard of basic secondary education, the social responsibility and decision-making abilities of pupils should be developed based on instilling values in education. Therefore, the goals of teaching the Art of Rhetoric and instilling values should be directed to the development of the skills of writing systematically, logical and creative thinking, humaneness, and honesty. The "openness" and "accuracy" of tasks also can contribute to the development of pupils' creative skills (van der Zanden et al., 2020; Hernandez Sibo et al., 2024).

Conclusion. Adolescence is the period of formation of a person as an individual. Teaching without considering the socio-psychological characteristics of the pupil, who is an independent representative of a difficult period, is a breach of trust. Because the teacher should avoid imparting knowledge that is alien to the pupil's nature and teach knowledge not for school, but for life. Therefore, under the purpose of the study, the statements of psychologists were selected for consideration in teaching the Art of Rhetoric related to the behaviour of adolescents. The 8th-9th graders voluntarily answered survey questions prepared based on psychologists' statements. According to the result, the criteria "he is looking for himself: he wants to find his place and function in society"; "switches to abstract, scientific thinking: makes predictions, checks them, and makes conclusions"; "accepts the opinions, motives, and ideals of others" was found to be highly consistent with the statements.

About 74% of the 8th-grade pupils and 52% of the 9th-grade pupils want to learn the Art of Rhetoric. This result indicates that it is better to organize the "The Art of Rhetoric" class as an elective course. However, it is important to teach the Art of Rhetoric to any adolescent pupil. Since the school is considered a social place. The Art of Rhetoric contributes to pupils entering adulthood, and adapting to adult society more easily. This is one. And, secondly, during the study of Rhetoric patterns, a pupil learns ways of self-development of his creative ability. As a result, the pupil's listening ability, speaking skills, ability to solve problems, and writing style may come to a certain system through education and exercises related to the Art of Rhetoric. Thirdly, how to read and, especially, how to listen is one of the main skills that rhetoric offers. The materials and results of this research could be used to prepare elective courses aimed at developing the creative abilities of pupils for 8-9 grades of a secondary education school.

Acknowledgement. The article was prepared within the framework of the grant project AP15473614 "Cultural and linguistic competence in the educational paradigm: metalanguage connotation", approved by the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan.

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IRSTI 14.01.21 10.51889/2960-1649.2024.61.4.009

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PECULIARITIES OF STATION ROTATION MODEL APPLICATION IN ONLINE LEARNING

Abstract

This study investigates the effectiveness of the blended learning model (online instruction station rotation model) that was implemented for Turkish as a foreign language A2 level students. The research took a mixed-method approach, combining qualitative insights by ratio metrics in a quantitative manner. The data were gathered from a sample (n=16) of students who were listening and reading in the online instruction station rotation model. This research program was statistical, and it looked at students' performances. Results showed that students performed better on true/false and matching tasks than fill-in-the-gap exercises. The research also found that spelling mistakes in dictation tasks occurred at a more frequent rate and indicated that students tended to code-switch at the time of production, often reverting to their native language. The findings here provide important evidence of the characteristics of the challenges that learners face in this mode of instructional delivery. The study found that the students showed significant gains at stations for online instruction, in particular, when they worked on their own.

Keywords: blended learning, station rotation model, online instruction, listening and reading skills, teaching a foreign language.

Introduction. Over the past two decades, there has been a growing trend focused on integrating face-to-face instruction and electronic learning in learning environments with the ultimate goal of improving the effectiveness and efficiency of adult education. The terminology used in blended learning is extensively defined. For example, this type of inquiry could be a hybrid of teacher-led instruction and computer-based independent learning (Graham & Allen 2005; Ye et al., 2022; Chen et al., 2024). Some educators also argue that the concept of blended learning should include the use of multimedia types (Osguthorpe & Graham 2003; Yezhgurova & Prosvirnina, 2019; Kosagovskaya et al., 2021). Mayadas & Picciano (2007) explained how different people understand blended learning. According to Watson (2008), blended learning enhances the physical presence of traditional learning environments and sustains the dynamics of those environments online, providing a more meaningful and targeted training service so for students.

Blended learning materials and learning environments, which are complex combinations of technology and learning interventions, should be evaluated to ensure that they are designed with practical application. Levy (2002) argues that blended learning provides a space in which topics can be discussed in depth. Flexible models are adopted when planning and developing these materials, which are conducted in-house and attempt to take into account specific classroom features, students' levels of L2 proficiency, and language skills (Vandersenga et al., 2023; Tan et al., 2024).

Christensen et al., (2013) suggested that blended learning models combine teacher-centered instruction with online technologies to facilitate student-centered learning. Practice is usually done first and written first in this model (Christensen et al., 2013). This approach allows

students to flexibly engage with the material at their own pace, maximizing student time for practice, problem solving, or project-based activities Staker and Horn (2012) classify blended learning into four widely accepted models: (1) rotation, (2) flexible, (3) self-directed, and (4) enriched virtual. Specifically, in transitional models, students rotate through different learning activities based on a given program or instructor's instructional plan, with at least one online learning activity (Staker & Horn 2012). These models can include a variety of instructional methods such as small group or whole class instruction, group projects, individual instruction, and traditional pen and paper instruction (Christensen et al., 2013). Although students primarily learn the material in the classroom, this model includes a variety of learning strategies including at least one online learning component. The rotation model is further divided into four subcategories: (1) station rotation, (2) lab rotation, (3) flipped classroom, and (4) individual rotation. (Staker & Horn 2012, Lim, 2015). These subgroups vary in structure and delivery methods within the classroom.

Research on the use of the station rotation model in language teaching has shown that it places particular emphasis on the development of basic language skills. For example, Lim's (2015) study of Thai students found that, although students initially struggled with independent work and showed a high degree of reliance on their teachers, their ability to a practicing independently developed gradually, leading to more comfortable interactions with peers over time Similarly, Pimpiban (2016) used stations for Thai primary school students which included interaction and benefits of it is based on language activities and individual online discussions facilitated by teachers The study concluded that this approach enhanced students' language skills and highly motivated them to learn English.

Ogude and Chukwegwu (2019) found no significant difference between the station rotation model and the traditional teaching methods in assessing the reading comprehension performance of secondary school students. Based on the findings, they recommended that teachers incorporate technology-based learning strategies and encourage the use of computers, software packages and computer-assisted modules. Conversely, a study by Nisa (2018) showed that when the station rotation model was applied to reading comprehension skills, it proved more effective than traditional methods, increasing comprehension rates among students

Nagi (2018), who used the station rotation model to enhance the writing skills of English-prepared students in Cairo, found that this model significantly increased student writing motivation and productivity. Similarly, other studies focusing on academic writing skills have found comparable results. In a study conducted by Belaji and Ganpathy (2021) on the use of station rotation model in English writing classrooms, teachers and students reported that the model was effective in academic achievement and engagement but research also revealed challenges such as technical challenges and the need for innovation training.

Smalls (2019) discovered the effectiveness of station rotation and flipped classroom models in middle school settings, focusing on improving the academic English scores of seventh-grade students. The study indicated that both models effectively enhanced student development. Similarly, Nurkamto et al. (2019) implemented these models within an advanced English academic writing course in Indonesia. They concluded that blended learning frameworks facilitate flexible learning opportunities, thus permitting students to engage with their studies whenever and wherever they prefer (at their own pace). Furthermore, Ayob et al. (2020) discovered that the station rotation model significantly boosted student achievement by merging online learning with conventional face-to-face instruction. This integration not only heightened engagement but also provided personalized learning experiences, ultimately improving academic performance. These investigations advocate for the broader adoption of blended models in foreign language instruction, promoting more innovative and adaptable teaching methodologies.

In addition to the studies previously mentioned, research has also concentrated

on integrating effective learning strategies within the station rotation model. This model has been compared to traditional teaching methods and adapted for distance education. For instance, Sulistyorini (2018) assessed the efficacy of learning strategies in English classes utilizing the station rotation model, observing a significant improvement in student outcomes. Notably, differences were evident before and after the model's implementation. McCollum (2019) compared the station rotation model to conventional teaching methods and discovered that students in the blended learning environment excelled in reading skills. Furthermore, Jingtao (2023) investigated how the station rotation model affects the listening skills of Chinese university students learning English, where the experimental group revealed significant improvements compared to control group which was taught through traditional methods. Yukhymenko et al., (2024) explored that the station rotation model effectively fosters personalized learning and digital skills among higher education students in Ukraine. However, they also emphasized that successful implementation requires additional preparation and advanced digital competencies from educators.

Skolastika (2020) aimed to modify the conventional station rotation model into a virtual format in order to more effectively meet the needs of teachers and to enhance student engagement. Specifically, Skolastika (2020) proposed four distinct types of virtual station rotation activities: a teacher-led station, an online station, an offline station and an extension activity. This model was advanced in response to the need of transitioning from traditional to online getting to know in the period of the pandemic. The station rotation model's flexible structure lets in it to be effortlessly implemented in distance learning, tailor-made to students' circumstances, desires, pursuits, and to be available for technological resources.

Although there are notable advantages to blended learning, there continues to be a demand for further evidence regarding the impact of blended learning models on teaching Turkish as a foreign language (TFL), particularly concerning the acquisition of receptive skills such as listening and reading. In this respect, the current study aims to apply a certain blended learning model, namely station rotation, to students learning TFL by using different stations of online instruction, pair work, and group work, each being rotated in order to engage students in activities for the improvement of their receptive skills.

This research investigates students' performance within the Station Rotation Model's online station while learning TFL. The current study focuses on developing listening and reading skills of A2-level students by using activities assigned within the online station. The significance of the present study is that the online station allows students to learn individually and independently, which positively influences their self-discipline. It, therefore, shows that the online station has been effectively used to teach TFL through the improvement of the students' listening and reading abilities. The study has tried to answer the following three central research questions in determining how effective the online station is in the station rotation model:

1. How do true/false, fill-in-the-blank, and matching activities enhance students' receptive skills in TFL?
2. What is the role of linguistic and cultural associations in improving students' receptive skills during gap-filling and connotation activities in TFL?
3. How do dictation and question-answering activities reveal challenges in students' receptive skills, and what strategies can address these issues in TFL?

Materials and methods. The design of this research is a mixed-method, whereby qualitative data will be quantified using ratio analysis. This design was adopted to describe, develop, exemplify, and explain the impacts of online station on the students listening comprehension in teaching Turkish as a foreign language. Qualitative research methodology was applied to analyze the whole process, and as part of this, content analysis by coding and sub-coding was done in order to assess the performance based on the activities of the online station. The following section describes the research group,

methods of data collection, and procedures of data analysis.

The sample of the study consisted of A2-level students who were studying at the Preparatory Faculty of Khoja Ahmet Yesevi International Kazakh-Turkish University for learning Turkish as a foreign language. The station rotation model was carried out with A2 level Turkish learners totally for three weeks. In this respect, 16 students composed the sample and all of them were assigned as the experimental group of the research; 11 were female and 5 were male participants. This qualitative study constituted the sample groups through students. During the implementation process, all students participated in the activities on a voluntary at the station rotation model.

The station rotation model of implementation involved the carrying out of individual activities by learners at the online instruction station on certain skills related to reading and listening. Activities were designed on certain topics; the listening and reading materials, including videos, audio recordings, and songs, amongst others, were sourced mainly from several websites and YouTube channels. According to the purpose, at an appropriate time and with the expertise, the researcher prepared the listening and reading activities based on the chosen video and audio recordings. At the beginning of each lesson, the prepared materials were sent to the students in the form of a WhatsApp group. Later, at the online instruction station, students were given listening activity sheets corresponding to either the video or the audio recordings. They were also required to use headphones to listen individually.

The listening activities included questions in the form of true/false, multiple-choice, and fill-in-the-blank questions. True/False and multiple-choice questions identified both knowledge-based and comprehension-based understanding. Fill-in-the-blank questions were mainly during dictation activities and were supposed to test the cognitive, psychological, and social conditions of the students through writing what was being heard. In the case of the reading skill activities, it had generated discussion on only two topics, and the questions were prepared based on some matching, knowledge-based, and comprehension-based criteria related to the provided text. After the implementation of activities, data were collected from students' performances in the online instruction station including listening and reading skills.

The data from the online instruction part of the SRM were analyzed using the computer-assisted data analysis program MAXQDA 2020. During the online instruction station, which was individual student work, students participated in activities targeting their listening and reading skills. The MAXQDA program analyzed all the activities, while codes were developed by investigating the content of these activities. All the files containing the data of online instructions, before analysis, were imported into the program.

Coding activities relied on diverse activity types: true/false, filling in the gaps, connotation, dictation, matching, and answering questions (see Table 1). Sub-coding for each code was developed based on the content of the data. For the true/false activity, no further sub-coding was added because this activity required responses given in only two ways-correct or incorrect. However, for the fill-in-the-gaps activity, sub-codings were developed to reflect students' attempts to write what they heard, correct versus wrong spelling, and inability to perceive the word. Besides, since students made associations while filling in the gaps, these were analyzed under sub-codes reflecting influences from their mother tongue, foreign language, and background knowledge.

The perception code was used to identify how well the students perceive the main information from the listening texts, such as guessing the content of the text or failing to understand it completely. The data gathered from the performance of the students regarding their listening and reading activities in the online station were analyzed according to the codes established for use, where the emerging figures were assessed for evaluation of their performance.

Table 1. *Code System of Analysing Online Instruction Station Activities*

Code System	Sub-codings	Skills
True False	-true -false	listening & watching
Filling the Gap	-correct spelling -incorrect spelling -leave blank	listening & watching
Simulation	-native language -simulation word	listening
Dictation	-incorrect spelling -unknown word -most accurate	listening
Matching	-correct -incorrect	reading
Answering	-detailed & extended -normal -short -incorrect unanswered	listening; watching & reading
Perception	-grasp the main point -estimated comprehension -incomprehension	listening; watching & reading

Reliability was ensured through the review of all activities at the online station by experts and the incorporation of feedback. Qualitative analyses were made from the data obtained about the online station activities and then evaluated and presented quantitatively as ratios. In this way, the performance of students at the online station was analyzed using ratio analysis. In this way, the data collected during all the implementation were interpreted both qualitatively-using coding and sub-coding-and quantitatively-through the analysis of the ratio-to have a complete perception about the performance of the student.

Results. Students' performances are measured by the frequency of the codes and sub-codes that were created from the activities done within the online instruction station. This kind of analysis is necessary for giving the overall performance in terms of all students for specific codes, namely, true/false, fill-in-the-gap, simulation, dictation, matching, answering, and perception. This provided a comprehensive overview of the student's performance across various activities.

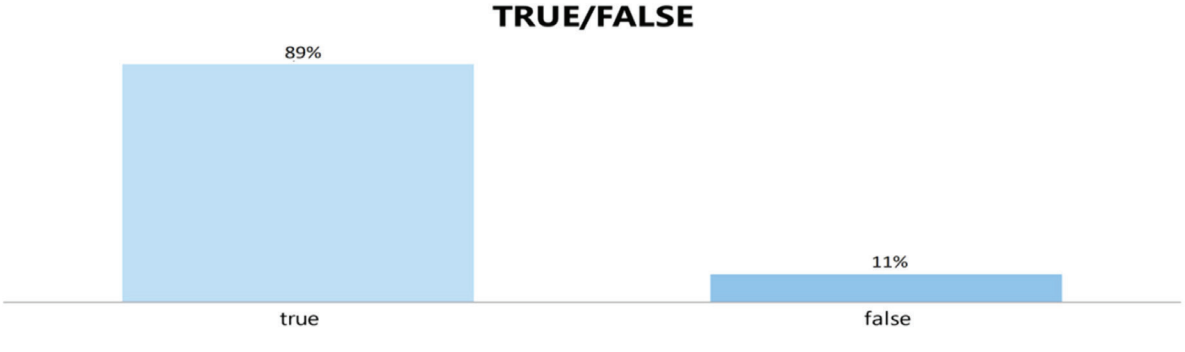

Figure 1: True/False Code Frequencies of Students' Performances

Coding for true/false was analyzed and reflected that 89% of the students had answered correctly, while 11% had answered incorrectly (Figure 1). It shows that the students did exceptionally well on true/false questions related to the listening skill activity.

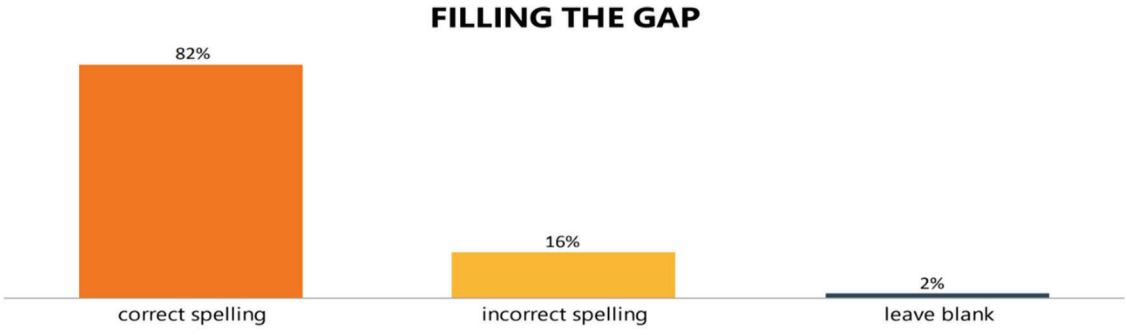

Figure 2: Filling the Gap Code Frequencies of Students' Performances

While examining the fill-in-the-blank coding, Figure 2 shows that 82% of students correctly wrote the words; 16% of the students made mistakes, while 2% left blank.

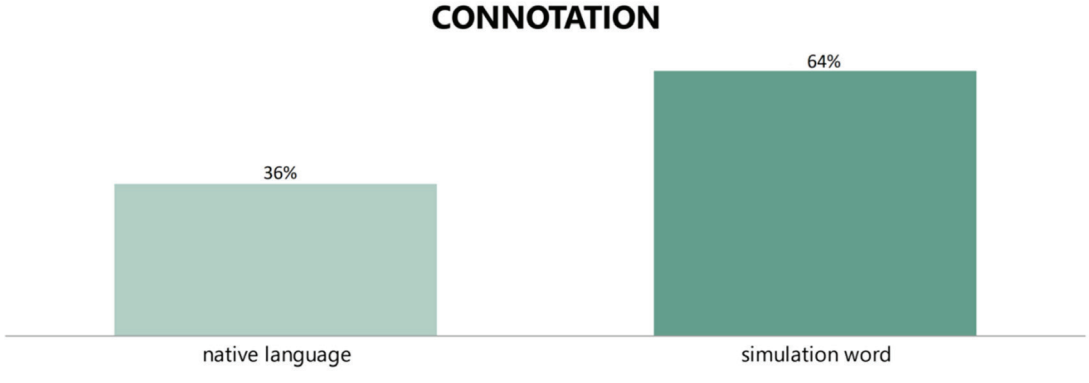

Figure 3: Connotation Code Frequencies of Students' Performances

The connotation coding is associated with the gap-filling activity and for that reason word choices made by students were examined based on associations they have made while writing. As shown by the analysis above (Figure 3), 64% of the students' associations were based on the words by drawing from their background knowledge, whereas 36% made those influenced by their mother tongue.

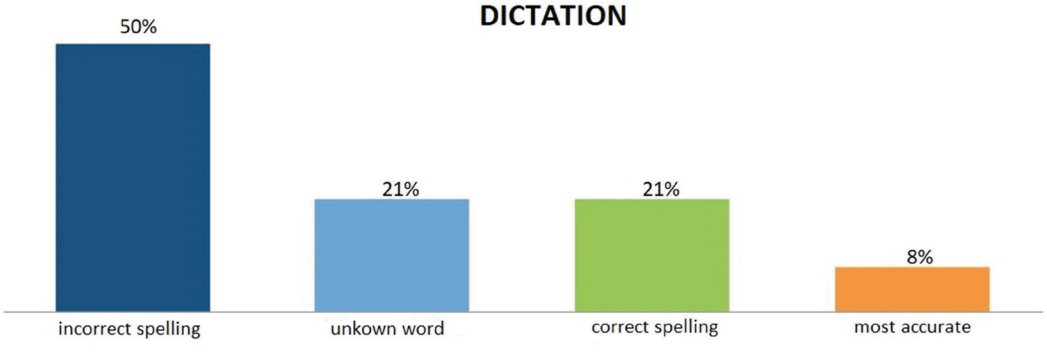

Figure 4: Dictation Code Frequencies of Students' Performances

The results from the dictation activity revealed significant challenges in students' writing skills, particularly in spelling accuracy (Figure 4).

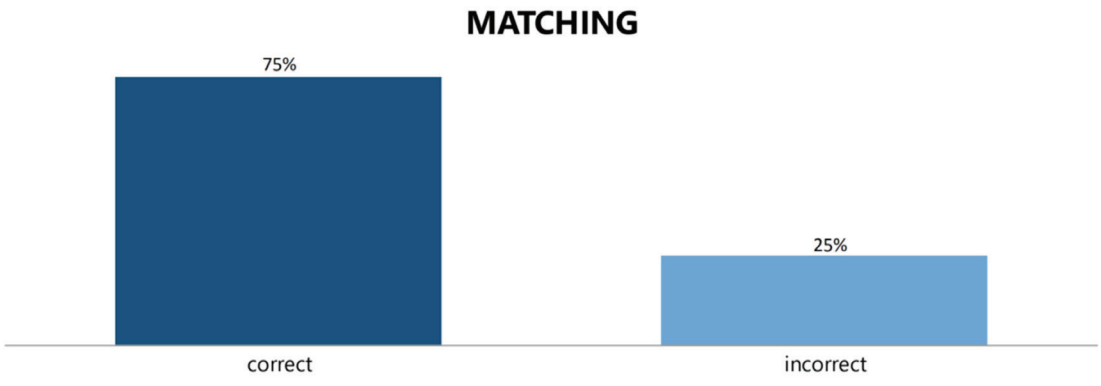

Figure 5: Matching Code Frequencies of Students' Performances

In the individual station, one of the subjects was given a matching activity, and as a result of the analysis of this activity, it was revealed that 75% of the students matched the words rightly while 25% matched them wrongly (Figure 5). It is observed herein that the students have an excellent level of vocabulary, knowing those words which are appropriate to their level.

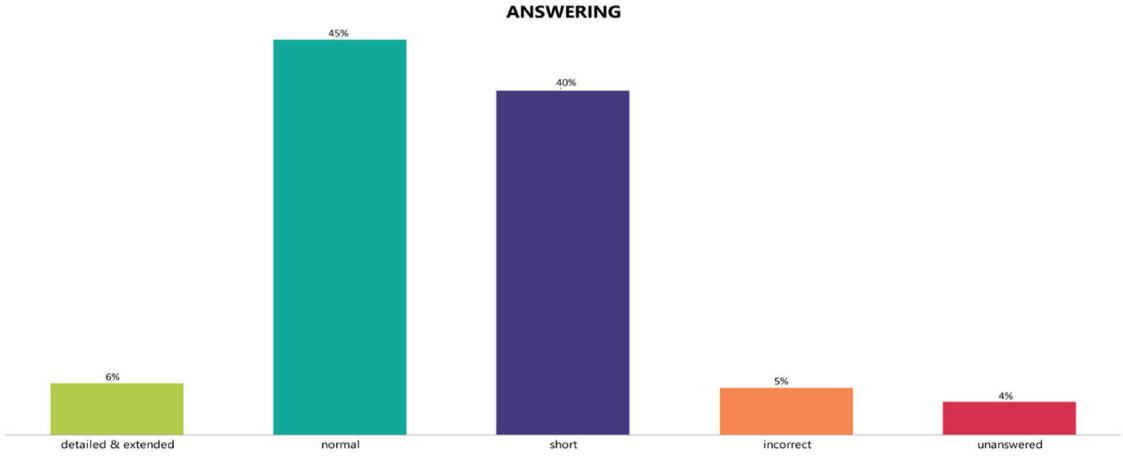

Figure 6: Answering Code Frequencies of Students' Performances

The findings from the question-answering activity in the online instruction station reveal a varied performance among students, with 45% providing average answers, 40% giving short responses, 6% offering detailed and extended answers, 5% answering incorrectly, and 4% leaving the questions unanswered (Figure 6).

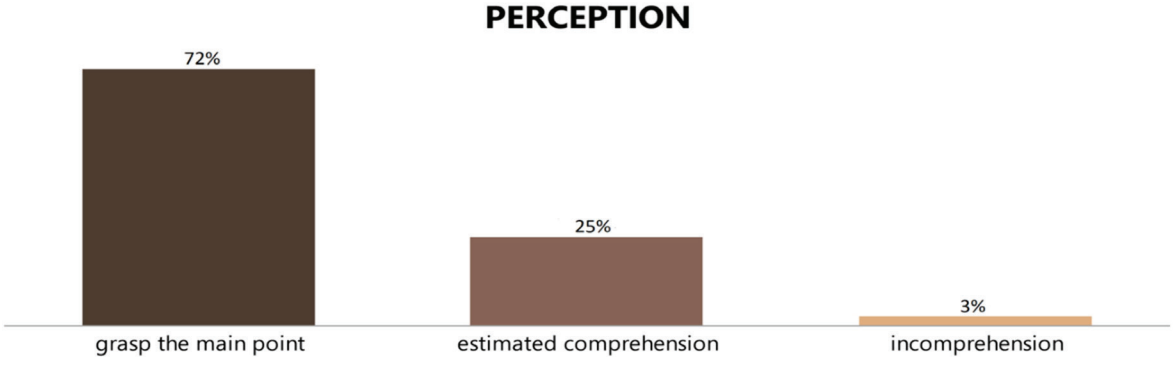

Figure 7: Perception Code Frequencies of Students' Performances

The perception coding data now show a positive result in students' listening comprehension skills Figure 7. It means that 72% of the students grasped the key information in the listening texts, which can reveal effective processing and comprehension of core contents by these subjects. The 25% who perceived the content as an estimate shows a reliance on the use of inference strategies to fill gaps in understanding. However, the fact that 3% of students could not understand the text of this test during a listening session underlines the chronic problems some learners experience with regard to the processing of auditory input.

Discussion. Students performed exceptionally well on the true/false questions on the listening skills task. True/False questions are known to be more efficient in learning, as they save time and directly test participants' knowledge (Burton, 2004). The rapid feedback and objective analysis of this question format provides particular advantages in listening activities. Martín-Luengo et al. (2021) pointed out that true/false questions were more effective when culturally adapted. Apparently, this was showing the importance of tailoring the tests to the target audience. This would therefore mean that these questions probably worked for the student because they were fitted into his cultural and linguistic background.

Overall, the students performed well in fill-in-the blank activities. Research indicate that filling-in-the-gaps testing increases short-term and long-term vocabulary knowledge (Masuhara & Tomlinson 2010). Clearly, this success with differentiation tasks helps students develop grammar and listening skills. Furthermore, Zhang et al., (2019) highlighted that gap filling exercises can improve memory performance in language learning, making it an effective tool for accurate word recall. This finding explains how many students were able to spell the words correctly.

Students often associated new words with words they already knew, perhaps because it was difficult to pay attention while listening or because there are so many similar words in Turkish. Yang emphasizes the importance of word association emphasizes importance in language learning, noting that learners naturally associate their existing knowledge with the vocabulary of new ones (Yang, 2018). The findings also suggest that these associations, based on students' prior vocabulary knowledge, are a natural part of language acquisition. Zhang and Li (2019) emphasized the importance of cultural and linguistic associations in language learning, suggesting that such association can enhance academic performance. These studies support the findings that students use associations influenced by their native and foreign languages, an effective creative learning strategy.

Results have shown that only 8% of the students were able to write a whole correct dictation, and the percentage of wrong writing by students was 50%, while 21% could not write a new word which they had not studied previously. Results have pointed out further developments which need to be developed in the writing skills of students, particularly spelling words which they come across for the first time.

Previous research supports these findings by citing the effectiveness of dictation in language learning. For instance, Syakur (2020) highlighted that dictation can be effective in providing language learners with ways of improving their listening comprehension and spelling accuracy, especially if the activity is created in a way that it contains familiar and relevant content for the students. Also, Morshedi and Nasiri (2020) mentioned how dictation tasks could reveal their deficiencies in phonological awareness, an important element in both listening and writing. It was revealed that it tallies with the observed fact that the students in this research depended so much on their mother tongue when doing dictation, which resulted in frequent spelling mistakes upon attempting to copy some unfamiliar sound or word.

It is noticed that the students have quite good vocabulary and know the words which are appropriate for their level. The results of the matching game show that the students improved in their knowledge and use of vocabulary. According to Figure 5, 75% of the students matched the words correctly, which means a good grasp of vocabulary at an appropriate level does exist. This finding agrees with a previous

literature review that vocabulary development forms a very significant basis of second language acquisition, especially in the case of learning English as a foreign language (Koç, 2023). Correct matching of words indicates that the students not only recognize such words but also know their meanings in specific context in achieving language proficiency (Alautdinova, 2023). Nevertheless, 25% wrong word matching still means there are some gaps that should be oriented in vocabulary acquisition. Such discrepancies in results may arise from limited exposure to some vocabulary items or semantic difficulties of differentiation among semantically similar words.

Sherman (1997) points out that the quality of students' responses in relation to school based language activities may be affected by a number of factors such as knowledge of the content, the type of tasks and the open questions being employed; hence, the questions may, and may not, attract the usage of longer responses. The fact that so many students wrote average or short responses is perhaps indicative evidence that students are learning the basic knowledge in a course without necessarily developing more sophisticated concepts or being able to say more about a topic beyond its most surface features. This, therefore, augments the work of Özçelik et al. (2023), who outline that scaffolding plays an important role in student progress from simple recall to more detailed and analytical responses.

The 6% who gave extended and detailed responses reflect that some students can do higher-order thinking and more in-depth analysis when answering questions. It would seem that, with the right support and encouragement, more students might achieve this level of performance. According to Kao and Kuo (2023), when the expectations and examples of the answers are given in detail, students will clearly understand what is expected from them and thus have a greater urge to do better. Conversely, 5% provided incorrect answers, while 4% were not answered, as areas where students were considered not confident or not to have understanding. According to Crowell and Au (1979), the errors that had taken place during the administration of the question-answering activities played a useful diagnostic role as they had pointed out some points which the students needed further teaching or practice. In the context of the present study, the findings suggested that some students may require additional assistance either in understanding the material or devising strategies for answering questions.

The 72% of the students grasped the main information in the listening texts, this proved that they grasped the core information given to them. It confirms what has been expressed in the literature about the importance of listening comprehension in second language acquisition. According to Ahmadi (2016), listening plays an important role in language learning because, through this skill, learners get the input they desperately need for good achievements in their language knowledge. This means that around 25% of the students would have taken the content as an estimate and utilized the inference strategies to fill the break in comprehension.

This seems to indicate that though the students understood the general concept, details were missed, which mostly happened during listening activities. According to Nazarieh et al. (2022), it is an active process; the listener himself actively constructs the meaning by decoding the linguistic input with the use of contextual cues and prior knowledge. On the other hand, it can be noticed that 3% of the students did not understand the text by listening; this reflects the difficulties some learners still face in dealing with information auditorily. This may be due to the inability to recognize slight phonetic differences or to attend appropriately during listening, as debated in the relevant literature on listening errors in language acquisition (Cho, 2021). Such challenges raise the need for the continued emphasis on targeted listening strategies that can be of great help in improving the comprehension of all the students, especially in distinguishing and then processing the spoken language accordingly.

In summary, while overall success in perception coding does point to the effectiveness of the instructional methods, it points out areas

where further support and practice should be given to ensure that all students can achieve a high level of listening comprehension.

As a result, it was determined that students made good progress at the individual study station and developed some progress in listening and reading skills. Besides, it is observed that, while listening and reading, with focusing on the subject carefully, the students worked and developed an ability of managing themselves at individual studies. Hence, it is possible that good performance of students affects language learning positively at this station.

Conclusion. The results of the research indicated that the online instruction station of the station rotation model showed effectiveness in improving receptive skills in the case of A2-level students learning Turkish as a foreign language. These results were reflected as notable improvements in the areas of listening and reading through such activities as true/false questions, fill-in-the-blank exercises, and matching tasks. In other words, the finding proved that the online radio station had helped the individual learning and autonomous work of students to be more self-disciplined and to improve their study practices. It also emerged from the analysis that the inclusion of materials relevant to the student's culture and language was a major contributor to their success. This particularly came out in the word association and comprehension activities. Some of the challenges, however, as identified in dictation and question-and-answer activities, point to the need for further instructional support in those areas. The study thus brings out the adaptability of the model and its potential for enhancement to accommodate the development of students' phonological awareness and higher-order thinking skills.

In summary, this study underlines that the station rotation model has the potential to effectively influence language learning due to the structured yet flexible environment that allows both individual and collaborative learning. The effectiveness of the online instruction station to enhance students' receptive skills may indicate that this model could be well implemented in teaching Turkish as a foreign language, particularly for the skills of listening and reading. At the same time, however, the study identifies further refinement of teaching approaches as necessary to adequately address a series of specific challenges that students face, so that all learners may benefit from this style of learning in depth.

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IRSTI 14.25.09 10.51889/2960-1649.2024.61.4.010

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PEDAGOGICAL ASPECTS OF IMPLEMENTING GAMIFICATION IN SECONDARY EDUCATION

Abstract

This paper looks at the role of games in teaching grammar to teenagers. The goal is to find out how students feel about gamification in educational settings and investigate how it affects grammatical abilities when used in grammar instruction. Gamification is using games for a specific purpose, such as teaching grammar to pupils. It goes beyond simply employing games for this reason. 10th grade were chosen as the participants of this research. There were two groups: experimental and controlled. The present study was built on three experimental stages: pre-test, interventions, and post-test with a questionnaire. During the pre-experimental stage, both groups were conducted a pre-test which contained 20 multiple-choice questions. Students' achievements in both groups were similar to each other. Then, students from the experimental group were taught grammar by using three games. By the end, two groups had post-tests and a questionnaire was taken from the experimental group. With the help of pre-test and post-test, the differences were defined. Students from the experimental group showed higher results compared to the control group. The data analyses, based on a questionnaire, prove that learners from the experimental group had positive perceptions about the games. Furthermore, fun and enjoyment make students stay motivated to learn new grammar.

Keywords: grammar skills, gamification, games, learners' perception, teenagers, classroom

Introduction. While teaching English to school learners, it is essential to grab students' attention so that they can engage in the learning process (Pirozhkova, 2014; Ebadi et al., 2024). Engaging students in the teaching process can be challenging, but various methods can make it more interesting. Internet resources offer a plethora of activities, methods, and games, complemented by books and studies. Game-based learning, or gamification, is considered highly effective (Zhang & Hasim 2023). However, it's crucial to understand that gamification involves more than just implementing games; it requires a specific educational purpose. Grammar, particularly for teenagers aged 14 to 18, can be tedious to learn. While some teachers use games, they're often not chosen appropriately for students' levels and interests. This study examines the use of gamification in grammar instruction to evaluate its effects on student performance and suggests possible advantages for straying from conventional teaching strategies.

Games are vital to the educational process because they keep students interested and inspired throughout the course. Because typical teaching methods, particularly when it comes to grammar, can be tedious and cause students to lose focus and concentration. Therefore, knowing some ways of implication games in teaching grammar can increase students' motivation and achievement in the learning process (Al-Kkhafai, 2022; Okumuş Dağdeler, 2023; Helvich et al., 2024).

Gamification, while not new in the 21st century, is often misapplied in educational contexts. Proper implementation requires understanding its purpose in learning and teaching. Gamification, according to Kapp (2012), is the use of game mechanics and thinking for problem-solving, learning, engagement, and motivation. Unlike broad

games, gamification specifically targets the learning process. Kiryakova et al. (2014) describe it as incorporating game elements into non-game activities. Maloney (2019) supports this by noting gamification enhances engagement, language skills, critical thinking, and problem-solving. Effective gamification meets students' psychological needs, fostering motivation and reducing anxiety, ultimately enriching the educational experience. The table below shows the illustration by Flores (2015) about the most important game elements and their definitions.

Table 1. *Definition of game elements*

Points	Numeric accumulation is based on certain activities.
Badges	Visual representation of achievements for the use shown online.
Leaderboards	How the players are ranked based on success.
Progress bars/Progression	Shows the status of a player.
Performance Graph	Shows player performance.
Quests	Some of the tasks players have to fulfil in a game.
Levels	A section or part of the game.
Avatars	Visual representation of a player or alter ego.
Social elements	Relationships with other users through the game.
Reward/reward system	System to motivate players that accomplish a quest.

Game components in education have been divided into two categories by researchers: self-elements and social elements. According to Huang & Soman (2013), self-elements that encourage self-competition and accomplishment are things like points, badges, levels, and time constraints. Social elements, like leaderboards, foster interactive competition and cooperation among students. Cheong et al. (2014) found these elements enhance social interaction, engagement, and feedback, aligning well with social constructivism. Kiryakova et al. (2014) emphasized the careful selection of game elements based on educational goals to avoid hindering the learning process.

De Freitas (2006) categorized games used in technology-based classrooms into four distinct types. The first category, educational games, refers to video or computer games designed to achieve specific learning objectives. The second category, online games, utilizes technologies such as Flash and Java to provide interactive and engaging experiences. Serious games, the third category, are primarily intended for educational purposes, often focusing on teaching or skill development. Lastly, simulations are computer-based models that replicate real-world situations, allowing learners to explore and understand complex scenarios in a controlled environment.

Musilova (2010) categorised language skill games into cooperative, communication, competitive, and code-control types, each targeting specific language skills. De Freitas (2006) offered a four-dimensional framework for selecting educational games, stressing context, representation mode, academic approach, and learner specifics. Proper selection and implementation of games are crucial for enhancing learning outcomes and aligning with educational goals.

Huang & Soman (2013) outlined five steps for applying gamification in education, emphasizing outcome definition. Flores (2015) supported this, showing its enhancement of L2 learning. Studies focus more on productive skills, neglecting grammar, vocabulary, and pronunciation. Caganaga & Yıltanlılar (2015) emphasized games as educational tools that break monotony and add fun. Freitas (2006) stressed context, duration, technical support, and community in game-based learning. Gamification effectively engages students and enhances skills when properly used. Identifying aims and student needs is crucial. Rafiq et al. (2019) found gamified grammar training

enjoyable and motivating. Furdu et al. (2017) highlighted benefits like increased motivation and personalised learning. Motivation, sustained through feedback and active involvement, is crucial (Kapp, 2012).

Games have been found to reduce language learning anxiety, lowering fear of poor evaluation, and enhancing engagement (Yolageldili & Arıkan, 2011; Caganaga & Yıltanlılar, 2015). Considering learning styles is crucial for selecting appropriate games, although not all games fit every style (Caganaga & Yıltanlılar, 2015). However, gamification also has drawbacks, including mandatory play and inappropriate leaderboard use, which can increase anxiety and lower motivation (Furdu et al., 2017; Stojković & Jerotijević, 2011).

Games must match students' levels, ages, interests, and learning styles. Teachers should carefully select and vary games to maintain engagement and achieve educational purposes. De Freitas (2006) called for more research on effective game-based learning, although existing studies offer some guidance.

Materials and methods. The methodology section presents a structured and detailed approach to investigating the effectiveness of gamification in grammar instruction. The study employed a mixed-method design, incorporating both quantitative and qualitative data collection methods. Teacher interviews provided initial insights into student profiles, while an experiment compared an experimental group using gamification techniques with a control group following the standard curriculum. Quantitative data were gathered through tests and questionnaires, and qualitative data were collected through observations during lessons.

The research was conducted in three stages. During the pre-experimental stage, teacher interviews identified students' learning styles and existing grammar knowledge, and a pre-test with 20 multiple-choice questions established baseline knowledge for both groups. The experimental stage involved the experimental group participating in gamified grammar lessons using games like Tic-tac-toe, Kahoot, and Hot Potato, with sessions held twice weekly for 15–25 minutes and tailored to student needs. The control group continued with traditional lessons. Finally, the post-experimental stage included a post-test with identical content to evaluate learning outcomes and a questionnaire to assess the experimental group's attitudes toward gamified instruction.

The study involved 39 10th-grade students aged 16–17, divided into an experimental group of 20 students and a control group of 19 students. Classes were held three times per week, with adjustments for gamification sessions. Data collection instruments included interviews focusing on learning styles and prior exposure to language games, as well as pre- and post-tests with 20 multiple-choice questions on grammar topics like tenses, gerunds, and infinitives. The games utilized included Tic-tac-toe for sentence formation, Kahoot for interactive mobile assessments, and Hot Potato for kinesthetic engagement and quick thinking. A questionnaire with six Likert-scale statements measured students' attitudes toward gamified lessons.

The methodology was informed by established research. Kapp (2012) described gamification as applying game mechanics to enhance learning and motivation, while Flores (2015) emphasized the motivational benefits of elements like points and leaderboards. De Freitas (2006) highlighted the importance of aligning games with educational objectives and learner needs, and Huang and Soman (2013) outlined effective gamification strategies. Additionally, Musilová (2010) categorized grammar games for targeted language skills.

This comprehensive methodology enabled the exploration of gamification's impact on student engagement, motivation, and grammar learning outcomes, providing valuable insights into its practical applications and challenges.

Results. This research aims to assess gamification's influence on grammar skills in teaching and gauge learners' perceptions. It encompasses three stages: pre-experiment, experiment, and post-experiment, addressing two key questions: 1) How does teaching grammar through games impact student

achievement? 2) What perceptions do students hold regarding gamification?

The pre-experimental stage was before the teaching process in which we conducted interviews with teachers to find out background information about students. Following this, a pre-test was conducted among students of the experimental and controlled groups to see the final result along with the post-test.

The interview served as the initial step in gathering additional information about the students. Two teachers from both the experimental and controlled groups participated, providing insights into the learning styles of the experimental group students. The interview, conducted in a dialogue format, included two questions: 1) What are the students' learning styles? and 2) Do students have experience with language games? Teachers identified students' learning styles as primarily competitive, interpersonal, dynamic, visual, and active, favouring group activities and kinesthetic exercises. However, they lacked experience with grammar-focused games, with only occasional exposure to vocabulary or communication activities. Despite being in the 10th grade, students' teenage nature emphasizes the importance of incorporating language games into the educational process.

Once the result of the interview was collected, we started conducting a pre-test which consisted of 20 multiple-choice questions about grammar. The topic of questions was related to grammar which would be presented further. They were the review of tenses, gerunds, and infinitives. The results of the experimental and controlled groups are given below.

The experimental group in which there were 20 students in general, completed the pre-test. The tests were given at the beginning of the lesson and took 10-15 min to finish. Students had to write their names and grades, however, in this research paper, their confidentiality was kept. Therefore, we used codes for participants, such as number, and their group (experimental and controlled). E stands for experimental, C stands for control, and P means participant.

According to the results of the pre-test, 10 students got three out of five-point-evaluation. The next five students got four points, while three students received the lowest mark of two. Furthermore, only two students achieved the highest mark of five points. In general, almost 65% of students achieved lower grades, meanwhile, students who showed brilliant results were just over 10%. The results of all participants are illustrated in the table below:

Table 2. *The results of the pre-test in the experimental group*

Participants	Results of pre-test (max 20)	Grade out of 5	Participants	Results of pre-test (max 20)	Grade out of 5
1PE	14	4	11PE	10	3
2PE	13	4	12PE	9	3
3PE	4	2	13PE	13	4
4PE	18	5	14PE	8	3
5PE	10	3	15PE	7	3
6PE	8	3	16PE	8	3
7PE	10	3	17PE	4	2
8PE	19	5	18PE	9	3
9PE	5	2	19PE	10	3
10PE	14	4	20PE	14	4

Regarding the controlled group, overall, 19 students participated in this stage. The test was also conducted at the beginning of a lesson with the same topic as it was in the experimental group. Students spent approximately 15-20 min to complete the test as well. For the sake of students' confidentiality, we presented their codes instead of their names as can be seen in the table below.

The results of the controlled group indicate that only one student achieved the highest mark, while two students got the lowest grade.

In terms of others, seven students scored four points, and the rest nine students achieved three points. Similar to the experimental group, 58% of participants scored the lowest grade, however, only 5% could reach the highest point.

Table 3. *The results of the pre-test in the controlled group*

Participants	Results of pre-test (max 20)	Grade out of 5	Participants	Results of pre-test (max 20)	Grade out of 5
1PE	18	5	11PE	8	3
2PE	10	3	12PE	10	3
3PE	13	4	13PE	9	3
4PE	13	4	14PE	2	2
5PE	7	3	15PE	12	4
6PE	4	2	16PE	11	4
7PE	9	3	17PE	6	3
8PE	15	4	18PE	15	4
9PE	8	3	19PE	7	3
10PE	12	4			

By looking at the table below, we can see that there was a slight difference between the two groups. The results indicated that there were not many students who reached the highest marks, but both groups had a lot of number of low grades. In both groups, the number of higher grades did not reach over 40%, which means that the majority of students might not know the topic. Concerning the content of a grammar test, gerund and infinitive was a new topic for them. Nevertheless, the questions about the review of tenses were those topics that they already passed. The results of both groups are presented in the table below:

Table 4. *The overall result of the pre-test in both the experimental and controlled group*

Scores (max 20)	Grades (max 5)	Experimental group (20)	Controlled group (19)
16-20	5	2	1
11-15	4	5	7
6-10	3	10	9
1-5	2	3	2

As we expected the result of the pre-test was almost similar in both groups. Nearly, almost all the lower and higher grades' percentages were similar. Few students reached the highest mark, meanwhile, approximately two-thirds scored the lowest grades. It can be concluded that the reason for lower grades is that students were not aware of the topic of the test or they had a misunderstanding about past topics.

The experimental stage was conducted to see three interventions. These interventions happened to the experimental group, however, the control group passed lessons without them. These interventions were in the form of games, which were selected before the teaching process. Even though more games tended to take place in the classroom, however only three of them were used in practice. In this stage, the main tools were intervention and observation. Games for the classroom were derived from the study of Ardoiz Garcıa (2017). They were "Tic-tac-toe", "Kahoot" and "Hot Potato". After each of these games, students were given points according to their correct responses and badges. This chapter describes how students felt and behaved during these three interventions from the teacher's observation.

The Tic-tac-toe game took place in the classroom after introducing the grammar for controlled practice. Students in two groups had

to look at the board, put X or O in a grid, and make sentences out of the words given. The result of observation from the teacher's side indicated that students were a bit confused as it was their first time experiencing this kind of activity. Moreover, students felt a bit anxious and hesitant in their answers, however, after they got used to this game. One of the possible reasons for feeling hesitant is that the game was for controlled practice, after introducing and completing some individual exercises. As it was focused, more on accuracy students might feel anxious to some extent. Still, the game was interesting and engaging for them. The next time, this game was conducted for the second time, but it included pictures instead of keywords. Students had to do the same task by looking at the pictures and describing what was happening. This time the game was more interesting and easier for them compared to the first version. Because it gave students freedom and imagination, also they already got used to this type of game.

In general, "Tic-tac-toe" was challenging for the first time, but after some modification and changes, students were engaged in the learning process. Besides, the fact that they worked in teams gave them a feeling of confidence as well as competitiveness.

The Kahoot game was used as a game for a cool down at the end of a lesson. It was also interesting and engaging for students because of the usage of devices. However, due to problems with internet connection students had to play in pairs. This game was also conducted two times with different types of questions concerning gerund and infinitive. The type of questions were usually multiple-choice questions. The fact that Kahoot uses mobile phones as well as interesting interfaces grabbed students' attention and involved them in the learning process. Moreover, after playing this game, the teacher and students worked on mistakes and discussed them. If this kind of test was in the form of a standard worksheet test, students wouldn't be as engaged in this game as it was with Kahoot. As a result, it can be concluded that this game is best to use as an assessment or evaluation tool in a playful environment.

The Hot Potato game is a mingling activity in which students go around the classroom passing the ball to each other while music is playing. When the music stops, the students who are holding a ball at this moment look at the board and do the task in a given time. There were different types of questions concerning the review of tenses, gerunds, or infinitives. The game itself was conducted in the middle or at the end of a lesson and took about 15-20 min. As this game required physical and kinaesthetic styles, it was very amusing but at the same time great tool to involve students in the learning process. Sometimes a student who was holding a ball did not know the answer, and at this moment they were given a chance for other students to help. Thus, the atmosphere was more friendly and playful so that students did not feel nervous or hesitant. The teacher, in turn, tried to control the situation in the classroom, because some students avoided balls at all or did not move. Therefore, interference from the teacher's side was useful in some circumstances. Even though this game was held only once, students were very interested in the process and motivated to participate.

Generally speaking, students were engaged in these games even though at first it was a bit challenging for them to complete. On the other hand, the teacher managed the classroom so that students were in flow and were not interrupted by other things. Moreover, the teacher tried to hold a friendly and playful atmosphere as it helped them to feel more relaxed instead of nervous or anxious.

The post-experimental stage aimed at discovering whether interventions had an impact on students' achievement or not. Moreover, the purpose was to find out what kind of differences in the results of both tests showed. During the post-experimental stage, students had to complete a post-test and questionnaire. The post-test was administered to both groups, and the questions were identical to those from the pre-test. However, only students in the experimental group were asked to complete the questionnaire.

Following interventions, we administered a post-test to the experimental and control

groups. There were 20 multiple-choice inquiries about grammar in the pre-test; the questions, the setting, and the time were all the same. However, this time all the content of this test was covered during the teaching period. They were the review of tenses, gerunds, and infinitives. The results of the experimental and controlled groups are given below.

All 20 students from the experimental group participated in the post-test as well and it was held at the beginning of a lesson for about 10-15 min. Even though some students missed classes during interventions, all of the students participated in both pre and post-tests.

The results of the post-test in the experimental group indicated that three students got five out of five, 11 students received four points, four students received three points and only two students got two points. In general, about 70% of students achieved good results, while the rest 30% received lower grades. The results of all participants are given in the table below:

Table 5. *The results of the post-test in the experimental group*

Participants	Results of post-test (max 20)	Grade out of 5	Participants	Results of post-test (max 20)	Grade out of 5
1PE	15	4	11PE	13	4
2PE	15	4	12PE	11	4
3PE	4	2	13PE	14	4
4PE	19	5	14PE	12	4
5PE	12	4	15PE	8	3
6PE	9	3	16PE	8	3
7PE	14	4	17PE	3	2
8PE	19	5	18PE	11	4
9PE	9	3	19PE	15	4
10PE	18	5	20PE	14	4

Concerning the controlled group, all 19 students took part in the post-test, which was conducted at the beginning of a lesson for about 15-20 minutes. The post-test was held in experimental and controlled groups, and the questions were the same as in the pre-test.

The table below illustrates the results of the post-test in controlled groups. As we can see, only one student could achieve the highest mark, six students received four points, 10 students got three points and two students scored two points out of five. Overall, the percentage of those who achieved good marks was just above 35%, however, the remaining 65% received lower grades.

Table 6. *The results of the post-test in the controlled group*

Participants	Results of post-test (max 20)	Grade out of 5	Participants	Results of post-test (max 20)	Grade out of 5
1PE	18	5	11PE	8	3
2PE	10	3	12PE	10	3
3PE	13	4	13PE	9	3
4PE	13	4	14PE	2	2
5PE	7	3	15PE	12	4
6PE	4	2	16PE	9	3
7PE	9	3	17PE	6	3
8PE	15	4	18PE	15	4
9PE	8	3	19PE	7	3
10PE	12	4			

In the table below in which the results of both experimental and controlled groups are compared, we can see the difference between them. After interventions had happened, students in the experimental group improved and many students reached higher results than it was before. The majority of students, who received three points at the beginning of an experiment, reached four points in the post-test. However, the result of the control group did not change compared to the pre-test. The results of both tests pre- and post-tests in the controlled group remained almost the same. The table below shows the overall number of students who received particular points:

Table 7. *The overall result of the post-test in both the experimental and controlled group*

Scores (max 20)	Grades (max 5)	Experimental group (20)	Controlled group (19)
16-20	5	3	1
11-15	4	11	6
6-10	3	4	10
1-5	2	2	2

Broadly speaking, the results of the post-test in experimental and controlled groups showed a difference in the number of students. More students in the experimental group improved their marks from lower grades to higher. Also, these students felt and behaved more confident than it was. Nevertheless, the results of the control group did not change a lot compared to the results of the pre-test.

Along with the post-test for the experimental group, a questionnaire about students' attitudes towards games was conducted. It consisted of six statements and aimed at discovering twenty students' perceptions of using games in learning grammar. The questionnaire was held in a classroom immediately after a post-test. It was in the form of a Likert scale, which includes five options to choose from as an answer. They are: "strongly disagree", "disagree", "neutral", "agree" and "strongly agree", which were calculated from one to five respectively. The results of this questionnaire were interpreted by using Standard deviation to see the overall answers of students.

The graph below illustrates how 10 students agreed, 4 strongly agreed, 5 remained neutral, and 1 disagreed with the first statement, «Language game encourages me to learn the English language». Since 3.85 is near to «Agree» according to the standard deviation, we may conclude that most students concur with this statement.

Concerning the second statement, "It is easier to understand concepts in grammar with language games", eight students answered "Agree", six students chose "Strongly agree", three students chose "Neutral", two students answered "Disagree" and only one student chose "Strongly disagree". The overall Standard deviation is 3.8, which means that most of the students agree with the statement.

In the third statement "I am more confident in learning English with the help of language games", eight students chose "Neutral", seven students agreed, two students strongly agreed, but one student disagreed, and two students strongly disagreed. The Standard deviation is calculated at 3.3, which means many students remain neutral on this question.

The next fourth statement "Language games provide me with a positive learning experience" in which a Standard deviation showed 3.7. Because many students, in particular, 11 students agreed, two students strongly agreed, however, six students were not sure, and one student disagreed.

The fifth statement "I prefer learning with language games rather than the traditional method" received the highest Standard deviation of 3.95, which means that the majority of students almost strongly agree. Because the number of students who chose "Agree" and "Strongly agree" were the same. Seven students answered each "Agree" and "Disagree",

furthermore, four students chose "Neutral", and two students chose "Disagree".

The last statement "Teachers should use language games more often in teaching the English language" also reached the highest Standard deviation. The results showed 3.95, which means that most of the students strongly agree with this statement. The exact number revealed that nine students strongly agreed, four students agreed, meanwhile, five students chose the "Neutral" position, and one student answered for each of the remaining options.

In general, this questionnaire aimed at finding out what students think about using games in the classroom and how they accept them. The students of the experimental group completed this questionnaire since they were taught through games. Overall, students perceived gamification positively, and they would like to have more games in the classroom, especially when it comes to grammar. Moreover, the majority of students prefer games more than traditional methods, nevertheless, they still do not feel confident while playing games due to lack of experience. To conclude we can state that games help students to understand grammar concepts better because they feel a positive learning experience and motivation.

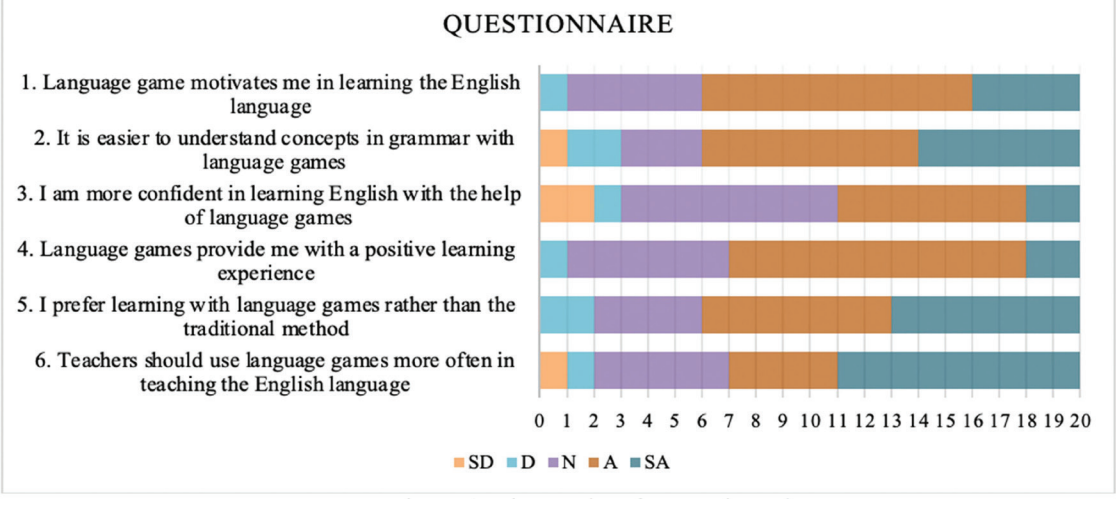

Figure 1: The Results of a Questionnaire

Discussion. The discussion underscores the comprehensive approach and significant findings of the study on gamification in grammar learning. During the pre-experimental stage, the pre-test revealed similar grammar proficiency levels between the experimental and control groups, establishing a baseline for comparison. Teacher interviews highlighted students' diverse learning styles, such as competitive and visual preferences, while also noting their unfamiliarity with grammar-focused games. This stage laid a solid foundation for assessing the impact of gamification.

In the experimental stage, various gamification tools were utilized. Tic-tac-toe evolved from initial hesitation to enjoyment as students appreciated its visual and creative aspects. Kahoot increased engagement through interactive quizzes, although technical issues occasionally disrupted its effectiveness. Hot Potato fostered collaboration and participation, creating a playful and relaxed atmosphere conducive to learning. Observations showed that gamification improved motivation, reduced anxiety, and boosted confidence, transforming grammar learning into a more engaging experience.

The post-experimental stage revealed significant performance improvements. The experimental group achieved a 70% increase in grammar proficiency, significantly outperforming the control group. Student feedback was overwhelmingly positive, with many appreciating gamification's ability to simplify grammar concepts and make learning enjoyable. However, initial anxiety highlighted the importance of

introducing games in a low-stress environment to maximize their effectiveness.

Key insights from the study emphasized gamification's role in improving achievement, increasing engagement, and fostering positive perceptions of learning. Students valued the interactive nature of the games, although technical and adaptive challenges underscored areas for refinement. Recommendations for educators include selecting games aligned with students' unique learning preferences, fostering a supportive environment to reduce stress, and proactively addressing technical issues to ensure seamless implementation.

The study highlights the transformative potential of gamification in grammar education, demonstrating its ability to enhance achievement, motivation, and enjoyment. Future research could explore its broader applications in language learning and develop strategies to address its challenges. These findings offer actionable insights for educators aiming to integrate gamification into their teaching practices, emphasizing its capacity to create a dynamic and effective learning environment.

Conclusion. Gamification offers an effective strategy for making grammar lessons more engaging and enjoyable. Games in this context are not merely for entertainment but are designed with clear educational goals in mind. As Kapp (2012) highlights, gamification integrates game mechanics and elements to address challenges and improve learning outcomes, motivation, and engagement. This study examines the impact of gamification on grammar skills while exploring students' perceptions of its effectiveness within a Kazakhstani high school setting.

The findings align with prior research, such as studies by Flores (2015) and Huang and Soman (2013), which emphasize gamification's ability to enhance engagement and language acquisition by meeting psychological needs and fostering a motivating, low-pressure learning environment. Key insights from this study include:

Improved student performance: The experimental group showed significant gains in grammar proficiency compared to the control group. Approximately 70% of the experimental group achieved higher grades, in contrast to only 37% in the control group. These results support Furdu et al.'s (2017) assertion that gamified learning improves academic success.

Enhanced motivation and engagement: Gamification increased participation and enthusiasm, with activities like Kahoot and Hot Potato sparking interest. These findings are consistent with Musilová's (2010) conclusion that interactive games promote engagement through movement, collaboration, and healthy competition.

Positive perceptions: Most students in the experimental group reported that gamified grammar lessons were both enjoyable and effective. This observation aligns with Rafiq et al. (2019) and Yolageldili & Arikan (2011), who note that games create a supportive environment that reduces anxiety and encourages active learning.

Despite these benefits, challenges were also noted, such as technical issues with internet-based games and initial reluctance among students unfamiliar with gamified instruction. These challenges underscore the importance of thorough preparation and fostering a supportive, low-stress classroom environment to maximize gamification's potential.

Educators can enhance the impact of gamification by carefully selecting games that align with learning objectives and cater to students' preferences, as emphasized by De Freitas (2006). Creating supportive environments that reduce anxiety and foster constructive competition, as recommended by Huang and Soman (2013), further strengthens the effectiveness of this approach. Additionally, gathering student feedback can help refine and improve game-based learning activities to better meet learners' needs.

Future research could expand the scope of this study by examining gamification's application to other language skills, such as vocabulary acquisition or listening comprehension, and by addressing technical challenges associated with technology-based gamification.

In conclusion, gamification offers a transformative method for teaching grammar. When thoughtfully implemented, it not only enhances academic achievement but also makes

learning an engaging and dynamic process. As more educators adopt gamified strategies, the potential to revolutionize traditional teaching methods and inspire students is likely to grow, paving the way for innovative educational practices.

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IRSTI 14.01.45 10.51889/2960-1649.2024.61.4.011

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DEVELOPING FUNCTIONAL LITERACY OF PRIMARY SCHOOL STUDENTS BASED ON INTELLECTUAL AND CREATIVE SPEECH SKILLS

Abstract

In the current education system, students' functional literacy holds significant importance. It can serve as a tool for developing competencies and activating students' cognitive activities. The development of a student's knowledge and competencies is closely linked within a unified learning-cognitive process. One of the aspects of this interconnection is the emphasis in school education on forming students' functional literacy as a tool for self-development, in accordance with their interests and abilities. The methodological basis of the research is formed by contemporary school education concepts, the main principles of school pedagogy, the theory of developing communicative skills in teaching, the theory of developing students' functional literacy, and the scientific foundations of communicative education technologies. The sources of the research included state documents on the development of education in Kazakhstan and abroad, scientific works of domestic and foreign scholars on the issue under study, periodicals from Kazakhstan and other countries, materials from scientific-practical conferences, educational programs, and teaching and methodological manuals. During the research, we examined the student's learning process and the formation of students' functional literacy within a unified educational-cognitive process. One aspect of this interconnection is the scientific approach in the educational process, where teaching functions as a tool for understanding the surrounding world and as a tool for self-development in accordance with the student's interests and abilities.

Keywords: functional literacy, primary school, intellectual and creative speech skills, reading, writing, listening, speaking, educational technologies.

Introduction. The modernization of education is driven by changes in contemporary society. In a rapidly changing world, the education system must develop the quality of professional universalism – the ability to change fields of activity and methods of work. At present, society is undergoing global informatization. Modern society needs individuals who can quickly adapt to changes occurring around the world. In these new conditions, the educational process in schools should be aimed at developing competencies that contribute to the implementation of the «lifelong learning» concept. A prerequisite for the development of competence is a certain level of functional literacy.

Functional literacy is one of the key components of modern education, ensuring the successful social adaptation and professional fulfillment of an individual in society. Establishing the foundations of functional literacy in primary school is important, as it is during this stage that basic knowledge and skills are formed. One of the effective methods for developing functional literacy is through the development of intellectual and creative speech skills.

The formation of functional literacy in the educational process today requires new approaches and innovative methods to improve the effectiveness of this process. It must be achieved through the development of intellectual

and communicative abilities, as this contributes to the integrative participation of the individual in broader social processes.

In modern pedagogical science, experience has been accumulated in research on education and training, including studies dedicated to forming students' functional literacy with the help of new educational technologies. All research organically combines psychological and pedagogical approaches to address these issues. A set of psychological and pedagogical methodologies is applied, ensuring the development of new psychological and pedagogical recommendations for fostering functional literacy.

Under the conditions of updated educational content, teaching school subjects involves using communicative teaching technologies aimed at maximizing students' engagement in the educational process. The primary goal is to teach students to think critically, construct speech in multiple languages, analyze, compare, generalize, and draw conclusions. The teaching process should focus on interpersonal interaction and the humanization of pedagogical influence in the educational and instructional process. The foundation of communicative teaching technology includes the practical orientation of school instruction; the communicative-speech basis of the learning process; the integrated organization of teaching materials; a differentiated approach in teaching; and the maximum intensification of the learning process. The communicative teaching method encompasses five principles: the principle of speech-thinking activity; the principle of personalization with a leading role for the personal aspect; the functional principle; the situational principle; and the principle of «novelty».

Functional literacy is increasingly recognized as a fundamental skill necessary for academic success and lifelong learning. In the context of primary education, developing students' literacy skills encompasses not only reading and writing but also the enhancement of intellectual and creative speech skills. As emphasized by Chen, F. (2022), fostering these skills significantly contributes to improving students' overall literacy outcomes.

Developing intellectual and creative speech skills involves promoting critical thinking, creativity, and effective communication among students. According to Smith and Brown (2021), integrating creative arts into literacy education provides a pathway for young learners to engage with texts in meaningful ways. This approach not only enhances comprehension but also encourages students to express their ideas creatively.

Materials and Methods. In his Address to the Nation, President Kassym-Jomart Tokayev expressed confidence in the future by stating: «The younger generation must be competitive not only in Kazakhstan but also in other countries» (Tokayev, 2024). Special attention should be given to the level of functional reading literacy among the younger generation, and one of the main ways to achieve this is by developing the functional reading literacy of individuals from primary school onwards, contributing to their further development. The PIRLS international study opens the way for developing children's functional reading literacy.

Through international assessment systems like PIRLS, it is possible to assess primary school students' readiness for life and their level of social adaptation using specific criteria related to each type of functional literacy. Competencies serve as the criteria in this case. Developing functional literacy involves advancing from the traditional primary school model to the rational model and then to the phenomenal model (Aleksashina, 2019). Achieving this goal is expected to place Kazakhstan among the leading countries in terms of the level and quality of education.

Johnson (2020) highlights the impact of collaborative learning on functional literacy. Group activities allow students to practice communication skills and learn from one another, fostering an environment conducive to literacy development. By engaging in discussions and group projects, students develop essential social and cognitive skills necessary for effective communication.

The effectiveness of project-based learning in enhancing functional literacy is further examined by Williams and Lee (2019). This method allows students to engage in hands-on

projects that require them to apply their literacy skills in real-world contexts. Such experiential learning opportunities contribute to deeper understanding and retention of knowledge.

Currently, diagnosing the level of functional reading literacy among primary school students through communicative tasks is linked to the paradigm of competence-based education. The current learning process is primarily based on subject-specific knowledge, and the development of a child's general worldview, life skills, and the focus on expected outcomes are closely tied to fundamental changes in every part of the methodological system of education (Vinogradova, 2017). Therefore, the set of knowledge, skills, and competencies that primary school students must acquire, defined by the competencies they develop, is essential. From an educational perspective, actions aimed at developing a wide range of skills and functional reading literacy are implemented as part of the education process (Vinogradova, Kochurova, & Kuznetsova, 2018).

Assessment plays a critical role in measuring students' literacy development. Garcia (2023) discusses various assessment strategies, emphasizing the importance of formative assessments that provide ongoing feedback to both students and educators. Effective assessment techniques can help identify areas for improvement and guide instructional practices.

Both domestic and international studies play a significant role in the research of functional reading literacy among primary school students. Shuttleworth-Edwards and Peña (2009) found that current developmental theories allow for verification, clarification, and improvement in the formation of literacy. Furthermore, foreign scholars such as Carnoy and Ainley (2015) have extensively examined the sources of important data that determine the success of teaching functional reading literacy in children. Ivanova and Kardanova (2018) analyzed how to ensure and verify the international comparability of the results of functional reading skills assessments in primary school students and their academic performance.

Patel (2022) underscores the significant role of parental involvement in enhancing functional literacy. Engaging parents in their children's literacy development creates a supportive learning environment that extends beyond the classroom. This partnership is crucial for reinforcing literacy skills at home and encouraging students to practice their abilities regularly.

Incorporating technology into literacy education can also enhance students' engagement and learning outcomes. Thomas (2021) explores how digital tools can be utilized to promote functional literacy and creative speech skills, providing personalized learning experiences that cater to diverse student needs.

The study involved 10 primary school students from one school. The experiment was conducted over one academic year in three stages:

1. Diagnosis of the initial level of students (reading, writing, listening, speaking).

2. Conducting lessons using methods aimed at developing speaking skills.

3. Final diagnosis of students' speaking skills and analysis of the obtained results.

Standard tests and tasks, developed based on curricula and methodological guidelines, were used to assess speaking skills. The test results were processed using statistical methods.

During the research, we applied the following methods: theoretical (analysis, synthesis, classification, generalization, deduction, induction, analogy, and modeling); empirical (observation, surveys, interviews); experimental (diagnostic, developmental, and concluding experiments); and statistical (statistical data analysis, qualitative and quantitative analysis of research results).

The methodological foundation of the research was based on contemporary school education concepts, the main principles of school pedagogy, the theory of developing communicative skills in teaching, the theory of developing students' functional literacy, and the scientific foundations of communicative education technologies. Research sources included state documents on the development of education in Kazakhstan and abroad, scientific works of domestic and foreign scholars on the issue under study, periodicals from Kazakhstan and other countries, materials from scientific-practical conferences, educational programs, and teaching and methodological manuals.

Results.

Table 1. *Indicator of high efficiency in using interactive and communicative teaching methods*

Skill	Before the experiment	After the experiment
Reading	55%	75%
Writing	50%	70%
Listening	45%	85%
Speaking	40%	88%

The analysis of the results showed a significant improvement in listening and speaking skills, which indicates the high efficiency of using interactive and communicative teaching methods. Students began to perceive and analyze audio information better and expressed their thoughts verbally with greater confidence.

Lin (2020) emphasizes the importance of cross-cultural approaches to literacy development in diverse classrooms. Understanding how cultural differences influence literacy practices allows educators to adopt inclusive teaching strategies that resonate with all students.

Preparing educators to effectively foster functional literacy is essential. Kim and Sanchez (2023) highlight the significance of teacher training programs in equipping teachers with the necessary skills to implement effective literacy practices in their classrooms.

The experiment results demonstrated a significant improvement in primary school students' speaking skills. The average levels of skills before and after the experiment are shown in Table 1. During the study, we examined the student's learning process and the development of students' functional literacy within a unified educational-cognitive process. One aspect of this relationship is the scientific approach in the educational process, where teaching functions as a tool for understanding the surrounding world and as a tool for self-development according to the student's interests and abilities.

1. Assessment of skill levels:
   - Before the experiment
   - After the experiment
2. Skills:
   - Reading
   - Writing
   - Listening
   - Speaking
3. Assessment by percentages:
   - Before the experiment:
   - After the experiment:

The diagram shows a comparison of skill levels before and after the experiment: reading, writing, listening, speaking.

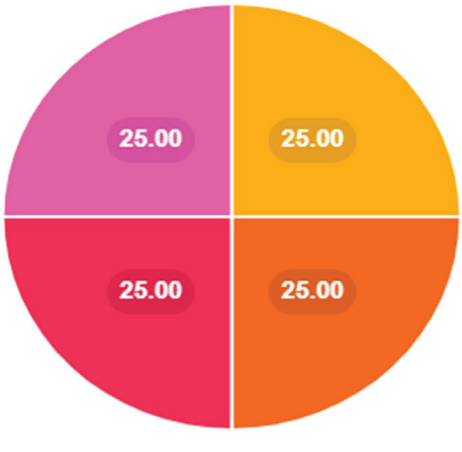

Figure 1: Indicator of the development of functional literacy in primary school students based on intellectual and creative speech skills

The diagram shows the development of functional literacy in primary school students based on intellectual and creative speech skills. The diagram highlights the balanced attention given to developing reading, writing, listening, and speaking skills.

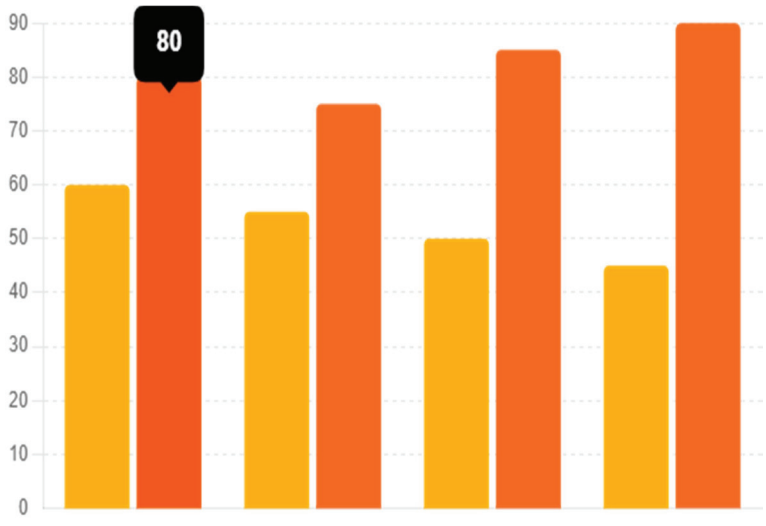

Figure 2: Comparison of the levels of functional literacy development before and after the experiment

The diagram shows the changes in the development of reading, writing, listening, and speaking skills before and after the experiment. It is evident that the results after the experiment significantly improved.

Table 2. *Indicator of changes in the development of reading, writing, listening, and speaking skills*

Student	Reading (before)	Reading (after)	Writing (before)
Student 1	53	78	48
Student 2	59	73	54
Student 3	61	79	56
Student 4	57	81	51
Student 5	60	77	55
Student 6	54	80	52
Student 7	58	74	49

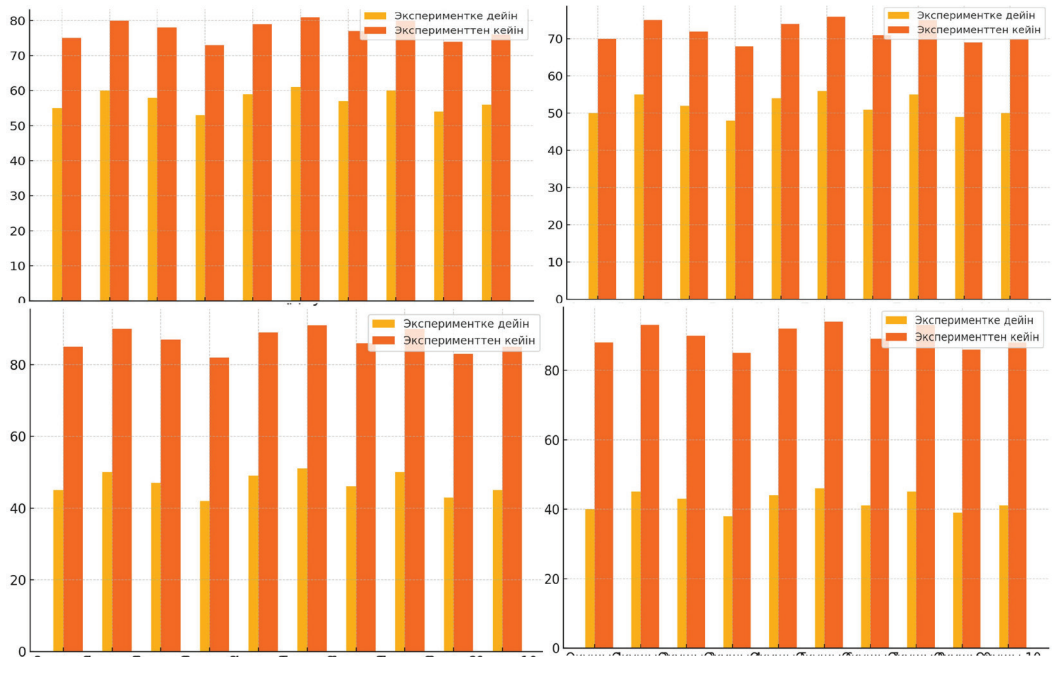

Figure 3: Comparison of students' skill levels in reading, writing, listening, and speaking before and after the experiment

Here are the specific results of the experiment on developing functional literacy in primary school students based on intellectual and creative speech skills. The diagrams show a comparison of students' skill levels in reading, writing, listening, and speaking before and after the experiment. The results of the experiment demonstrate significant improvements in reading, writing, listening, and speaking skills.

In current pedagogical research, the concept of functional literacy is viewed not merely as the ability to read but as the ability to comprehend the meaning of any complex text. In this sense, it is the most important ability that a student must develop in primary school. If this ability is established, further learning becomes easier; if not, further learning may become difficult or even impossible. At present, there are educational tools designed as simulators for functional literacy, containing complex texts written in various languages, accompanied by questions for each text.

It has been established that the foundations of functional literacy are formed in primary school. During this period, the teacher pays special attention to stimulating students' speech activities: learning to speak, listen, read, write, and count. The teacher's targeted and systematic work in this direction contributes to the development of general learning (universal) skills in elementary school students.

In addition, the primary school teacher must cultivate basic competencies (informational, communicative, and reflexive) in students, foster the need for self-development and self-education, and ensure readiness for further education at the next stages.

Discussions. Let us highlight the characteristic features of functional literacy. According to A.A. Leontiev, «a functionally literate person is someone who can use all the knowledge, skills, and abilities accumulated throughout life to solve a wide range of vital tasks in various areas of human activity».

Based on the theoretical and practical experience of researchers at the Institute for Educational Strategy, led by Doctor of Pedagogical Sciences N.F. Vinogradova, we propose a list of methodological recommendations aimed at enhancing the effectiveness of primary school teachers' work in developing students' functional literacy:

1. Organize the educational process as an activity, focusing on students' ability to learn independently. In this regard, the subject being studied acquires an activity-based nature.

2. Implement the teaching program considering the age and individual characteristics of students.

3. Ensure students' active participation in the learning process.

4. The educational process should be aimed at developing independence and responsibility in students' activities.

5. Use various forms of student work in lessons: individual, pair, and group work.

6. Employ active student-centered technologies in pedagogical activities: problem-dialogue (identifying and solving problems through teacher-organized dialogue), productive learning technologies (organizing learning activities according to the logic of phased work with texts), and project-based technologies (creating posters, models, organizing exhibitions, conducting research).

7. Create problem-based learning situations in lessons.

8. Differentiate the learning process according to levels.

9. Develop students' informational, communicative, and social skills.

10. Evaluate students' educational outcomes and achievements.

I.A. Zimnaya distinguishes three groups of core competencies based on the category of activity and allowing for the assessment of an individual's overall culture: «competencies related to understanding oneself as an individual and as a subject of life» (health maintenance, value orientation in the world, integration, citizenship, self-improvement, self-regulation, self-development, personal and subject reflection, etc.); «competencies related to interacting with other people» (social interaction, communication competencies); «competencies related to human activity in all its forms and types» (competencies in play, learning, work, cognitive activity, and information technology, etc.).

Conclusion. The development of functional literacy among primary school students is a multifaceted process that requires the integration of intellectual and creative speech skills. Through innovative teaching strategies, collaborative learning, and effective assessment techniques, educators can significantly enhance students' literacy outcomes. Furthermore, parental involvement and the use of technology play crucial roles in supporting students' literacy development. As educational practices evolve, ongoing professional development for teachers remains vital to ensure they are equipped to foster functional literacy effectively.

In conclusion, through conducting a SWOT analysis, it was determined that developing functional literacy based on intellectual and creative speech skills in primary school students offers significant advantages. However, it was also concluded that some challenges need to be addressed through systematic efforts to resolve the issues. For the successful implementation of this initiative, it is necessary to consider all aspects, work on enhancing strengths and utilizing opportunities, eliminate weaknesses, and minimize potential risks.

Table 3. *SWOT Analysis: Developing Functional Literacy in Primary School Students Based on Intellectual and Creative Speech Skills*

SWOT Analysis: Developing Functional Literacy in Primary School Students Based on Intellectual and Creative Speech Skills	
Strengths: 1. Comprehensive teaching approach: Intellectual and creative speech skills include reading, writing, listening, and speaking, ensuring the well-rounded development of students. 2. Early development of core competencies: Primary school provides the foundation for further successful learning and socialization.	Weaknesses: 1. Time and resource intensity: Developing speech skills requires considerable time and effort. 2. Insufficient teacher training: Some teachers may not be adequately prepared to apply these methods.
3. Increased motivation to learn: Interactive and creative teaching methods make the learning process more engaging and appealing. 4. Enhanced critical thinking and analytical skills: Speech skills contribute to the development of critical thinking, essential for solving real-life problems. 5. Student-centered approach: A personalized approach helps address the needs and abilities of each student individually.	3. Lack of available methodological materials: There is a shortage of specialized resources and tools for developing speech skills in primary school.
Opportunities: 1. Introduction of modern teaching methods: Interactive and communicative teaching methods can help improve students' functional literacy. 2. Government support: Updated education programs and standards are aimed at developing functional literacy. 3. Improvement of educational resources: There is an opportunity to develop new teaching materials based on research outcomes.	Threats: 1. Dependence on traditional teaching methods: Teachers may be resistant to moving away from traditional methods, slowing the adoption of new approaches. 2. Insufficient material and technical base: A lack of technological resources in schools could reduce effectiveness. 3. Disparity in student readiness levels: Since students' abilities vary, some may face difficulties in mastering the necessary skills.

Thus, the methodological basis for developing functional literacy in students at the primary general education level is the activity-based approach, which focuses on

creating specific pedagogical conditions to organize students' cognitive independence. This approach includes the use of problem-dialogue teaching technologies, the project method, group work forms in lessons, and interactive tools (informational, electronic-technical, etc.). Specifically, at the primary education stage, students' leading activity is the learning process itself. The teacher should not only provide new information through an explanatory-illustrative method but also personalize the students' learning activities by linking education to various human activities.

The formation of functional literacy among primary school students through the development of intellectual and creative speech skills is essential for fostering comprehensive educational growth. As the research demonstrates, these skills not only enhance students' ability to communicate effectively but also contribute significantly to their overall cognitive development, social integration, and academic success.

By integrating intellectual and creative speech activities into the curriculum, educators can create dynamic learning environments that stimulate critical thinking, encourage collaboration, and promote active engagement among students. These elements are vital in preparing young learners to navigate the complexities of the modern world, where effective communication and adaptability are paramount.

Moreover, the adoption of innovative pedagogical strategies, such as project-based learning, collaborative activities, and the use of technology, can further enrich the educational experience. Such approaches not only make learning more relevant and enjoyable but also empower students to apply their skills in real-world contexts.

In conclusion, the emphasis on intellectual and creative speech skills as a foundation for functional literacy in primary education highlights the necessity of a holistic approach to teaching. By prioritizing these skills, educators can significantly enhance the quality of education, ultimately leading to the development of well-rounded individuals capable of contributing positively to society. The findings underscore the importance of continuous professional development for teachers to effectively implement these strategies and adapt to the evolving educational landscape. As we move forward, fostering functional literacy through intellectual and creative speech skills should remain a central focus of educational initiatives, ensuring that our students are equipped for success in the 21st century.

Acknowledgments. This article was developed as part of the project «Developing Functional Literacy in Primary School Students Based on Intellectual and Creative Speech Skills» in accordance with the calendar plan for the implementation of scientific and scientific-technical projects funded by the Rector's Grant, as per Order No. 05-04/329 dated 14.05.2024, from Abai Kazakh National Pedagogical University.

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IRSTI 14.37.27 10.51889/2960-1649.2024.61.4.012

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FRAMEWORK OF PROFESSIONAL COMPETENCIES OF EDUCATORS: A CASE RESEARCH OF TEACHERS IN WESTERN KAZAKHSTAN

Abstract

This research focuses on analysing the professional competencies of educators within the context of contemporary educational challenges. Using a qualitative approach and phenomenological design, semi-structured interviews were conducted with 13 teachers to examine their perception and implementation of professional competencies. The research revealed a common understanding of competencies as a complex of knowledge, skills, and abilities, but also uncovered significant discrepancies between theoretical understanding and practical implementation, especially in the areas of digital and research competencies. The results showed a high appreciation for the importance of social-emotional competencies, but insufficient attention to the development of digital skills and research practices. The research identified the need for a more structured approach to developing professional competencies and systemic changes in teacher training. It emphasizes the importance of developing a comprehensive framework of professional competencies that takes into account all aspects of modern pedagogical activity. Recommendations include strengthening training in digital technologies, integrating research competencies into professional development programs, and creating a support system for the continuous professional development of teachers.

Keywords: educator, the framework of professional competencies, professional competencies, Professional Standard Teacher.

Introduction. In the era of digitalization, globalization, and the ever-changing demands of the labor market, teachers face new challenges that require constant updating of their professional skills and competencies (Redecker, 2017). The relevance of the research on the professional competence of teachers and the formation of the framework of professional competencies is due to the rapid changes in the educational environment and the introduction of the Professional standard Teacher in Kazakhstan in 2022. The framework of professional competencies of a teacher is a structured model that describes the key knowledge, skills, and personal qualities necessary for the effective implementation of pedagogical activities. It is a comprehensive tool used to identify, develop and evaluate the professional qualities of teachers, including several main components: subject knowledge reflecting a deep understanding of the discipline taught and the ability to transfer this knowledge to students (Shulman, 1987); pedagogical skills, including the ability to plan and conduct lessons, use various teaching methods, evaluate student progress (Darling-Hammond, 2006); technological competencies, implying the ability to effectively integrate digital technologies into the educational process (Redecker, 2017); socio-emotional skills, allowing one to create a positive learning environment, manage the classroom, interact with students and colleagues (Jennings & Greenberg, 2009); research competencies, including the ability to analyze and reflect on their practice, participate in professional development (Cochran-Smith & Lytle, 1999); intercultural competencies necessary to work in a diverse educational environment and take into

account the cultural characteristics of students (Deardorff, 2006); and leadership qualities that inspire students and initiate changes in the educational environment (Leithwood et al., 2020).

The teacher's professional competence framework serves as a guideline for developing teacher training programs, evaluating their effectiveness, and planning professional development, helping to standardize expectations from teachers and providing the basis for a system of certification and career growth in education. The formation of a professional competence framework is necessary for several key purposes. First, it allows you to standardize expectations from teachers and ensure the quality of education at the systemic level (Caena & Redecker, 2019). Secondly, such a framework serves as a guideline for teachers' professional development, helping them identify areas for improvement and areas of growth (Darling-Hammond et al., 2017; Tzafilkou et al., 2023). Thirdly, it contributes to the development of more effective teacher training and professional development programs that meet the real needs of the educational system (Toom, 2019).

Well-defined competencies help in evaluating the effectiveness of teachers and can be used in certification and career advancement (Guerriero & Deligiannidi, 2017). In the context of the digital transformation of education, the digital competencies of teachers are of particular importance, which are necessary for the effective use of technology in teaching and preparing students for life in a digital society (Falloon, 2020; Āboltiņa et al., 2024; Moorhouse, 2023). Research also shows that well-defined professional competencies contribute to teachers' self-efficacy, which, in turn, has a positive effect on student learning outcomes (Zee & Koomen, 2016). In the context of the globalization of education, the professional competence framework also contributes to the international mobility of teachers and the harmonization of educational standards (European Commission, 2019). Finally, in light of the growing attention to inclusive education, the competence framework should include skills to work with a diverse contingent of students, which requires teachers to develop intercultural and socio-emotional competencies (Ainscow, 2020).

Thus, the formation of a framework of professional competencies of teachers is a critically important tool for improving the quality of education, adapting educational systems to modern challenges, and ensuring the professional growth of teachers in a rapidly changing world.

Materials and methods. The professional competence of a teacher is an integrative characteristic, including a set of knowledge, skills, and personal qualities necessary for the effective implementation of pedagogical activities. This multifaceted concept encompasses the ability of a teacher to solve professional problems, apply modern educational technologies, interact with students, colleagues, and parents, as well as constantly improve their professional skills.

Many domestic and foreign scientists, including Slastenin (2002); Zimnaya (2004); and Markova (1996) have been engaged in the research of the teacher's professional competence. Slastenin (2002) considers the professional competence of a teacher as a unity of his theoretical and practical readiness to carry out pedagogical activities, emphasizing the importance of forming not only subject knowledge in a teacher but also the ability to apply it in specific pedagogical situations.

Zimnaya (2004) proposed the structure of a teacher's professional competence, including motivational, cognitive, behavioural, and value-semantic components, making a significant contribution to understanding the multidimensional nature of this concept. Markova (1996) identified several types of professional competence of a teacher: special, social, personal, and individual, emphasizing the importance of developing all these aspects for successful pedagogical activity.

In foreign science, Raven (1984) considered competence as a multi-component phenomenon that includes cognitive, emotional, and volitional components. Modern research focuses on various aspects of a teacher's professional

competence. De-Juanas Oliva et al., (2019) studied the relationship between teachers' professional competence and their self-efficacy. Zhu et al., (2020) investigated the impact of teachers' professional competence on students' academic achievement.

The understanding of a teacher's professional competence is constantly evolving due to changes in the education system and society. Modern research is increasingly paying attention to such aspects as the digital competence of teachers, their ability to communicate interculturally, and their readiness for continuous professional development (Moorhouse et al., 2024). The professional competence of a teacher is a complex characteristic, including knowledge, skills, and personal qualities necessary for effective pedagogical activity. This concept covers the ability of a teacher to solve professional problems, apply modern educational technologies, and interact with various participants in the educational process.

Recent research has significantly expanded the understanding of a teacher's professional competence. Garzón-Artacho et al., (2022) conducted a systematic review of the literature on teacher digital competence, analyzing 73 studies and identifying key factors in its development. Fernández-Batanero et al., (2021) focused on the inclusive competencies of teachers, examining their preparation for working with students with special educational needs.

Pöntinen and Räty-Záborszky (2020) explored teachers' competencies in the field of sustainable development, demonstrating how educators integrate these principles into their practice. Mercader and Gairín (2020) studied the competencies of teachers in the field of innovation management in educational institutions, developing a model of key competencies for successful innovation. Caena and Redecker (2019) presented the European System of Digital Competencies for Teachers (DigCompEdu), which defines 22 competencies in six areas. This work offers a comprehensive approach to understanding and developing teachers' digital competencies.

The research on the professional competence of a teacher in Kazakhstan was conducted by several scientists who made a significant contribution to understanding this problem in the context of the national education system. Taubayeva (2020) studied pedagogical innovation and the development of the professional competence of teachers, focusing on the formation of their research culture. Zhajtapova (2006) investigated the issues of professional growth of teachers in the professional development system, considering the competence-based approach in the training of teaching staff. Uspanov (1999) studied the problems of the formation of professional competence of future teachers in the context of informatization of education. Abildina (2017) focused on the formation of the professional competence of future primary school teachers. Mynbayeva (2022) researched innovative teaching methods and their impact on the development of professional competence of teachers. The work of these researchers covers various aspects of the problem, including the training of future teachers, the professional development of existing teachers, the development of digital competencies, and the introduction of innovative approaches in education.

These studies show that the modern understanding of the professional competence of a teacher includes not only traditional pedagogical skills but also competencies in the fields of digital technologies, inclusive education, sustainable development, and innovation management. They also emphasize the importance of continuous professional development of teachers in a rapidly changing educational landscape.

Research question. How do teachers in Western Kazakhstan perceive and implement professional competencies in their teaching practice, and what are the discrepancies between their understanding of competencies and the real needs of modern education?

Research design. An approach based on phenomenology was used to design qualitative research. The paradigm is constructivist, as the research is based on the interpretation of

teachers' experiences through their own stories and explanations in interviews.

Data collection method. Semi-structured interviews, which allow for both predefined questions and flexibility to investigate participants' responses in greater detail, were the type of data collection employed in this study.

Sample. Thirteen professors who were specifically chosen to offer contextual relevance made up the sample. The utilisation of this particular sampling technique guaranteed that the experiences of the participants were in direct correlation with the research topic, hence enhancing our comprehension of the unique educational milieu in Western Kazakhstan.

Data analysis. Thematic analysis was used in conjunction with coding approaches for data analysis. Through the process of locating, classifying, and analysing patterns or themes in the interview data, researchers were able to thoroughly investigate the fundamental ideas of teachers' professional competencies and their practical application.

Results. A semi-structured interview with teachers was conducted with 13 teachers in Western Kazakhstan, including the following questions (Table 1):

Table 1. *Interview questions and analysis codes*

Interview Questions	Codes for Interview Analysis
Please tell us about your teaching experience and current position	The introductory part
How would you define the concept of «professional competencies of a teacher»?	PC: Understanding professional competencies
Which competencies, in your opinion, are the most important for a modern teacher?	
In which areas do you feel most competent as a teacher?	SC: Self-assessment of competencies
In which areas would you like to improve your professional skills?	
How do you usually develop your professional competencies?	DC: Development of competencies
What forms of professional development do you consider the most effective?	
How do you rate your skills in using digital technologies in education?	DC: Digital Competencies
What challenges do you face when integrating technology into the educational process?	
How important do you consider social and emotional skills to be in the work of a teacher?	SEC: Social and emotional competencies
How do you develop these skills for yourself and your students?	
How do you take cultural diversity into account in your teaching practice?	CC: Cross-cultural competencies
What difficulties do you face in working with students from different cultural backgrounds?	
Do you research your teaching practice? If so, how?	RC: Research Competencies
How do you use the research results in your work?	
Are you familiar with any framework of professional competencies of a teacher?	Frame C: Competence Frame
How do you think such a framework can be useful for teachers?	
What changes in the system of teacher training and support could help in the development of professional competencies?	SC: System changes
Is there anything else that you would like to add on the topic of professional competencies of a teacher?	

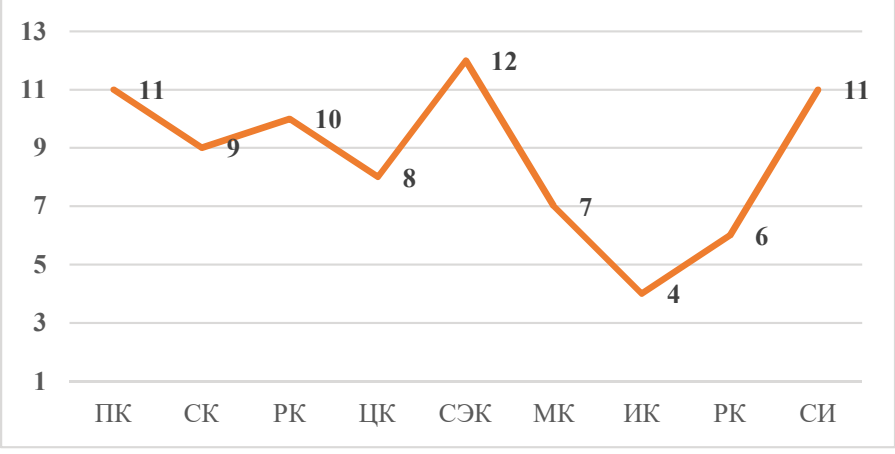

Figure 1: Interview results

Discussion. Based on the results of interviews with 13 teachers of Western Kazakhstan, we will analyze the interrelationships between the first question (definition of professional competencies) and other aspects of the interview:

1. Definition of professional competencies (PC). 11 out of 13 teachers defined professional competencies as a set of knowledge, skills, and abilities necessary for effective teaching activities.

Relationship analysis:

a) Self-assessment of competencies (SC):

- consistency: 9 teachers rated their subject knowledge highly, which corresponds to the inclusion of knowledge in the definition of PC.

- Discrepancy: 7 expressed uncertainties about digital competencies, which may indicate a lack of attention to technological skills in their definition of PCs.

b) Competence Development (RC):

- consistency: 10 teachers noted refresher courses as the main way to develop competencies, which corresponds to an integrated approach in defining the PC.

- discrepancy: only 6 mentioned self-education, which may indicate an underestimation of the importance of self-development of skills.

c) Digital Competencies (CC):

- Discrepancy: 8 teachers recognized the need to improve their digital skills, which may indicate that this aspect is not sufficiently included in their initial definition of PC.

d) Socio-emotional competencies (SEC):

- Consistency: 12 out of 13 teachers emphasized the importance of SEC, which may indicate the inclusion of this aspect in their understanding of PC, even if it was not explicitly mentioned in the initial definition.

e) Intercultural Competencies (MC):

- Partial compliance: 7 teachers noted a growing need for MC, which may reflect the evolution of their understanding of PC during the interview.

f) Research Competencies (IC):

- significant discrepancy: only 4 teachers regularly research their teaching practice, which may indicate the absence of this aspect in their initial definition of PC.

g) Competence Framework (K-frame):

- discrepancy: only 6 teachers are familiar with the concept of the competence framework, and only 3 have used them in their practice, which may indicate a gap between the theoretical understanding of the PC and the practical application of structured approaches.

h) System changes (SI):

- consistency: 11 teachers spoke in favour of the need for systemic changes in teacher training, which corresponds to the comprehensive understanding of the PC expressed in the initial definition.

The analysis shows that there is a general consistency between the initial definition of professional competencies and the answers to subsequent questions, especially about subject knowledge and the importance of socio-emotional competencies. However, there

are significant discrepancies in the field of digital and research competencies, which may indicate a lack of attention to these aspects in the initial understanding of PC by teachers. This discrepancy highlights the need for a more comprehensive approach to defining and developing teachers' professional competencies.

Conclusion. The research on the professional competencies of teachers in Western Kazakhstan revealed a complex picture of the perception and implementation of these competencies in the modern educational context. The analysis of interviews with 13 teachers revealed both areas of consistency and significant discrepancies between the theoretical understanding of professional competencies and their practical implementation.

The majority of teachers (11 out of 13) demonstrated an understanding of professional competencies as a set of knowledge, skills, and abilities necessary for effective teaching, indicating that there is a common base for further development of professional standards. However, the research also identified several significant gaps and areas that require attention.

The most noticeable discrepancies were observed in the field of digital and research competencies. Despite the recognition of the importance of digital skills in modern education, a significant proportion of teachers (7 out of 13) expressed uncertainty about their digital competencies, pointing to the need to strengthen teacher training in the use of digital technologies in the educational process.

An even more pronounced gap was observed in the field of research competencies: only 4 out of 13 teachers regularly research their teaching practice, indicating insufficient attention to the development of research skills in existing teacher training and professional development programs. A positive aspect is the high assessment of the importance of socio-emotional competencies (12 out of 13 teachers), which reflects the growing understanding of the role of emotional intelligence in the educational process. However, further research is needed on how teachers develop and apply these competencies in practice.

The results of the research also indicate the need for a more structured approach to the development of professional competencies. Only 6 teachers were familiar with the concept of the competence framework, and only 3 used them in their practice, indicating a gap between theoretical developments in the field of professional standards and their practical application in schools in Western Kazakhstan.

An important conclusion is the recognition by teachers (11 out of 13) of the need for systemic changes in teacher training, opening up opportunities for reforming the system of teacher education and professional development, taking into account the identified needs and gaps. The research highlights the importance of developing and implementing a comprehensive framework of professional competencies of a teacher that would take into account all aspects of modern teaching activities, including digital, research, and intercultural competencies. Such a framework should serve not only as an assessment tool but also as a guideline for the continuous professional development of teachers.

Within the framework of the research, it is recommended to strengthen teacher training in the field of digital technologies and their application in the educational process of schools; integrate research competencies into teacher training and advanced training programs; develop and implement a detailed framework of professional competencies; continue work on support and post-course support for continuous professional development of teachers based on identified needs and modern educational trends; Conduct regular monitoring and evaluation of teachers' professional competencies to identify areas that require further development.

This research represents an important step in understanding the professional competencies of teachers in Western Kazakhstan and opens up prospects for further research and practical measures to improve the system of teacher education in the country.

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IRSTI 14.35.07 10.51889/2960-1649.2024.61.4.013

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PROFESSIONAL STANDARDS AND EDUCATIONAL PROGRAMS: ANALYSIS OF PEDAGOGICAL CORRESPONDENCE

Abstract

The article presents the results of a study analysing the compliance of the content of educational programs in pedagogical universities for primary school teacher training with the norms of the Professional Standard for Teachers. The research aimed to identify «problem areas» in the content of teacher training educational programs and develop recommendations for stakeholders on improving continuous pedagogical education. A quantitative content analysis method was applied to analyse the programs. Based on the teacher standard competency framework, a table of frequency factors for compliance was developed. Using this research tool, educational programs from national, and regional universities, and a pedagogical institute in a monocity were studied. The study has limitations regarding the testing of a single assessment tool and the number of programs presented. The research results indicated that the program from the national university had the highest compliance with the teacher standard norms. Moreover, knowledge components significantly dominate educational programs. The content of educational programs revealed that professional teaching and development competencies of teachers have low-frequency indicators according to the Professional Standard norms. Based on the data obtained, recommendations were developed for stakeholders to further improve continuous pedagogical education.

Keywords: professional competencies, pedagogical education, standard, educational programs, content analysis.

Introduction. Issues related to the quality of pedagogical education and the effectiveness of teachers have become increasingly important in recent years. Global initiatives are being undertaken worldwide to improve the quality of pedagogical education through the transformation of state policy, the improvement of the content of training, retraining, professional development, and evaluation of teachers. In the face of global challenges to the education system, its quality wholly depends on the level of professional competence of teachers (Sabharwal et al., 2024). In Kazakhstan, the requirements for the professional competency framework for teachers are defined by the Professional Standard, developed as a norm specifying the requirements for qualification levels, competencies, content, quality, and working conditions (Prikaz, 2022).

The new version of the Professional Standard for Teachers, approved in 2022, provides a general description of the professional activities of teachers, including a competency framework. This framework consists of four professional components: values, knowledge, practice, and development. The Professional Standard also serves as the foundation for developing educational programs for teacher training. Research by Ingvarson, (2019); Alreshidi et al., (2024); Nawab et al., (2021); and Pedaste (2019) has shown that standards constructively influence teacher training processes when developed and used as a strategic position, guiding the description of the ideal teacher. In this regard, ensuring the quality of teacher education is essential worldwide.

In Kazakhstan, efforts are being made to provide the education sector with practice-

oriented pedagogical staff based on a competency-based approach to developing and implementing educational programs (Koncepciya, 2022). However, the issue of the alignment of teacher training program content with the norms of the Professional Standard remains underexplored. At the same time, research (Fan, 2023) has shown that the level of competency of the teacher determines the learning outcome of the students. Based on the results obtained, it is possible to develop recommendations for updating teacher training programs and further improving teacher education.

To address this task, a content analysis of programs was conducted to examine the frequency of using keywords related to the professional competencies of the Teacher Standard. The study aimed to identify «problem areas» in the content of teacher training programs and to develop recommendations for further improving teacher education. The research tasks included the following stages: developing the research methodology and tools, selecting educational programs from pedagogical universities, conducting content analysis and processing the data, conducting a comparative analysis, and, based on the research results, developing recommendations for stakeholders to improve domestic continuous teacher education.

Materials and methods. The main research questions were as follows: To what extent do universities follow the Professional Standard for Teachers when developing teacher training programs? and What 'problem areas' exist in the context of university programs?

To identify «problem areas» in developing educational programs in the national context, programs from three pedagogical universities were selected and developed for the 2023-2027 period (*national, regional, and monocity*).

According to the Order (Prikaz, 2018), one field of study was selected for the research - 6B013 Teacher Training without Subject Specialization (Primary Education). The analysis focused on bachelor's degree programs for primary school teachers. It is noteworthy that one of the programs presented for analysis was developed within the framework of the Ministry of Science and Higher Education of the Republic of Kazakhstan's «Education Modernization» project.

To analyse the content of the educational programs, a quantitative research method was chosen, based on content analysis of the educational programs' alignment with the norms of the Teacher Standard (Prikaz, 2022). The analysis included interpreting the context or meanings of key terms, counting their frequency of use, and analysing statistical data to identify patterns and trends in the use of the analysed units.

The appropriateness of using the content analysis method is justified by working with large volumes of textual material based on semantic categories (Rodrigues, 2021); the accuracy and objectivity of this method through a unified approach to analysing the educational program (Bulatbaeva et al., 2013); and structuring information based on methodologically grounded criteria and their indicators (Sergienko, 2021). In the process of content analysis, categories and contexts were examined, and statistical counting was performed. The study included coding the document to understand the meaning, significance, and interconnection of various elements of the text. The content analysis involved statistical counting, which allowed for measuring the frequency and prevalence of the categories analysed. The choice of research method was based on the theoretical foundations of the competency-based and constructivist approaches, which are focused on the learning outcomes of future teachers.

The application of content analysis is based on methodological principles such as systematicity, scientific validity, and objectivity. The principle of systematicity is reflected in the set of structured and interrelated elements: the methodological principles of the study; the scientific framework, including the goal, objectives, methods, and stages of the research; the research tools; and the Professional Standard for Teachers. The principle of scientific validity is based on the study of the achievements of national and international scientific literature,

as well as on positions corresponding to facts and current data. The principle of objectivity considers the possible factors and conditions influencing the course of the research and relies on scientific data and information obtained during the study. The principle of objectivity leads to well-founded conclusions supported by arguments.

Guided by these methodological principles, the following factors were considered during the content analysis:

For the analysis of educational programs, the content/description of the disciplines and learning outcomes were selected from the document, while the other sections of the program were excluded;

When phrases were repeated within the context of the same learning outcomes or discipline, the repeated phrases were removed, meaning the number of keywords were summed without duplication;

The identified keywords were selected within the semantic content of the relevant context according to the indicators of the teacher's professional competencies.

At the beginning of the study, keywords were identified in the textual context of the professional competencies of the Teacher's Standard to develop a coding table by categories and indicators. The importance of the location of keywords in the context of the textual material chain was considered when developing the research tools (Bryman et al., 2009; Mayring, 1994). The development of the content analysis tool was based on the Framework of Professional Competencies of the Teacher in the Professional Standard (Prikaz, 2022). The developed table of frequency factors for the compliance of the educational program with the norms of the Professional Standard for Teachers includes parameters such as competencies, criteria, indicators, and keywords (Table 1).

Table 1. *Table of Frequency Factors for the Compliance of the Educational Program*

Professional Competencies of the Teacher *(Analysis Categories)*	Criteria *(Subcategories of Analysis)*	Indicators *(Units of Analysis)*	Key Words* *(Units of Count)*
1) Professional Values	1.1 Commitment to the Teaching Profession	1.1.1 Shows belief in the ability of all students to achieve educational goals	a) educational goal
			b) student achievement
			c) belief
		1.1.2 Demonstrates dedication to the teaching profession	a) teaching profession
			b) dedication
			c) professional identity
		1.1.3 Adheres to current legal regulations in their activities	a) legal regulations
			b) standard
			c) program

The process of analysing educational programs begins with the systematic organization of data by defining semantic units using the frequency table. At this stage, a substantive structuring of the studied material is carried out, implying a structural content analysis of the terminological relationships in the text (Bryman et al., 2009). The units of analysis were studied within the context of the semantic part of the text, which expanded the understanding of the essence of the studied phenomena (Rodrigues, 2021); a structuring was carried out that allowed the evaluation of the content of educational programs based on set parameters through the analysis of the studied units (Sergienko, 2021).

To determine the frequency of concept usage in the text, a conceptual type of content analysis was chosen, which involves statistical counting of identified numerical patterns during the analysis of textual data, followed by their substantive interpretation (Hsieh & Shannon, 2005).

After the content analysis, the data is interpreted to describe and summarize the content of the programs and to identify patterns between the teacher's professional

competencies, their criteria, and indicators that form the document's content.

To determine the frequency levels of keyword usage (high, medium, low), the arithmetic mean (x) is calculated using formula (1), where a is the sum of the indicators, and b is their number:

$$\frac{a+b}{2} = x \quad (1)$$

To determine the threshold for a low level, we assume that the low level of keyword usage should be below the average level (<c), and the medium level should be equal to or above the average (=<c).

When determining the threshold for a high level of keyword usage (f), formula (2) is used, where y is a high indicator and x is the arithmetic mean:

$$\frac{y+x}{2} = f \quad (2)$$

During the counting, a high-frequency indicator of keyword usage in the program indicates a sufficient level of the program's focus on developing the corresponding professional competence in students, compared to other programs. Conversely, a low-frequency indicator of keyword usage signifies an inadequate level of focus on developing the corresponding competence in future educators.

Results. The study of the programs was conducted in three aspects, with the categories, subcategories, and units of analysis being: professional competencies (analysis categories); criteria for professional competencies (analysis subcategories); and indicators of professional competencies (units of analysis).

Categories of Analysis (Professional Competencies). As a result of the study, the data were summarized according to the frequency of keyword usage across different universities (see Table 2).

Table 2. *Data on Categories of Professional Competencies of the Teacher*

		University		
		National	Regional	Monogorod
Professional Values	125	61	42	22
Professional Knowledge	181	79	49	53
Teaching Practice	92	67	17	8
Professional Development	2	2	0	0
	400	209	108	83

The aggregated data on the study of professional competencies led to the following conclusions.

The largest number of keywords across all four categories of analysis was found in the educational program of the national university. The total number of keywords in the programs of the monogorod and regional universities is almost twice as low compared to the national university program.

In all programs, the knowledge component predominates, indicating that the teacher preparation programs for primary education are highly theoretical. This is evidenced by the analysis category of professional knowledge exceedingly twice the category of teaching practice. Considering that «a third of teachers in Kazakhstan lack subject knowledge and teaching methodology according to assessments of teachers' knowledge» (Ahmetjanova et al., 2023), it can be asserted that the teacher preparation programs in Kazakhstan and their implementation require significant revision and updating.

Content analysis revealed the absence of keywords related to the professional development of future educators in the programs. However, the issue of continuous professional development for teachers is relevant worldwide (Nawab et al., 2021). The Professional Standard for Teachers in Kazakhstan has been developed with requirements for professional growth in mind. It is presented as a set of norms defining the necessary competencies for teachers at

each stage of their professional career and a roadmap indicating further directions for their professional development (Prikaz, 2022). Continuous professional development for teachers involves qualitative growth from a «trainee teacher» model to a «master teacher» capable of leading initiatives to assess and improve subject content and teaching strategies based on research results, as well as transferring their experience and supporting colleagues. Foundations of motivating future educators towards continuous professional development should be established during their training. Therefore, indicators of a teacher's professional competence in professional development should be reflected in teacher preparation programs.

To compare the obtained data, an analysis was conducted based on the results of the annual ranking of university educational programs by the National Chamber of Entrepreneurs «Atameken» for the years 2019–2022. In the ranking, all criteria are divided into three blocks: career prospects of graduates, quality of educational programs, and achievements of students (Masanov, 2021). The quality of educational programs in the Atameken ranking is studied according to several criteria, including «compliance of content with labour market requirements» (assessed by the relevance of lecture topics and used sources) and «compliance of learning outcomes with industry standards and/or employer requirements» (assessed by the relevance of learning outcomes and the alignment of studied topics with achieving learning outcomes) (Masanov, 2021).

According to the ranking data for the educational programs of the universities under consideration for the years 2019–2022, there is a slight positive trend in the quality of educational programs at the national university and the university in the mono-city in 2021 and 2022. It is also worth noting the positive trend in career prospects for graduates of the national university, which indicates a clear focus of this educational program on improving the quality of training for primary school teachers. The comparative results based on the Atameken ranking indicators confirm the findings of this study regarding the greater focus of the national university's educational program on improving teacher preparation quality.

Analysis Subcategories (Criteria for Professional Competencies of Teachers). According to the conducted research on the frequency of key terms used in 14 criteria for professional competencies of teachers, cumulative indicators ranged from 0 to 98. The average value for determining the levels of frequency of key term usage was found to be 28.57. Accordingly, a low level is <28.56, while a medium level is ≥28.57. To calculate the boundary for a high level: (98+28.57)/2=63.29.

The boundaries are defined as follows: high level – from 63.29 to 98; medium level – from 28.57 to 63.28; low level – from 0 to 28.56. Thus, the results of the study are distributed as follows: Knowledge criteria for professional competencies have a high level of frequency of key term usage in the programs; civic position (professional value) and teaching process planning (teaching practice) have a medium level, while other criteria have a low indicator (see Table 3).

Table 3. *Data on the Criteria for Professional Competencies of Teachers*

Professional Competencies	Criteria	Total	%
1. Professional Values	1.1 Commitment to the Teaching Mission	27	6,75
	1.2 Civic Position	42	10,5
	1.3 Adherence to Professional Ethical Standards	10	2,5
	1.4 Responsibility	23	5,75
	1.5 Initiative	23	5,75
2. Professional Knowledge	2.1 Knowledge of Children's Characteristics and Application in Practice	83	20,75
	2.2 Knowledge of the Subject, Teaching Methodology, and Evaluation	98	24,5

3. Teaching Practice	3.1 Planning the Teaching Process	39	9,75
	3.2 Creating a Safe Educational Environment	21	5,25
	3.3 Implementing Instruction	7	1,75
	3.4 Assessing Students	13	3,25
	3.5 Collaboration	12	3
4. Professional Development	4.1 Reflection	2	0,5
	4.2 Self-Development Management, Leadership	0	-

Less than 5% frequency of key term usage was found for the following criteria of professional competencies, in descending order:

3.4 Assessing Students (3.25%)

3.5 Collaboration (3%)

1.3 Adherence to Professional Ethical Standards (2.5%)

3.3 Implementing Instruction (1.75%)

4.1 Reflection (0.5%)

4.2 Self-Development Management, Leadership (0%)

Analysis Units (Indicators of Professional Competencies of Teachers). According to the research on 51 analysis units (indicators of professional competencies of teachers), cumulative indicators ranged from 0 to 44. The average value is 7.8. Accordingly, a low level is <7.8, while a medium level is ≥7.8. To calculate the boundary for a high level: (44+7.8)/2=25.9. The boundaries for the levels are distributed as follows: high level – from 25.9 to 44; medium level – from 7.8 to 25.8; low level – from 0 to 7.7. Based on the calculation of the level boundaries, the data were interpreted into percentage ratios and are presented in Figure 1.

The research findings on the analysis of indicators of professional competencies of teachers lead to the following conclusions:

1) Professional Values: 50% of key terms are not used in the programs studied, indicating that half of the professional values are not being developed in the training of future teachers. It is necessary to update the content of modules/disciplines in primary teacher training programs, with special attention to developing professional values such as (in descending order): demonstrating belief in all students' ability to achieve educational goals; taking responsibility for students' academic success and upbringing; possessing self-regulation and stress-resilience skills; showing respect for students and their parents/legal representatives; and sharing responsibility for the educational and upbringing process within the teaching community.

2) Teaching Practice: 76.5% of key terms related to teaching practice are at a low-frequency level. In this regard, it is recommended that pedagogical universities significantly reconsider the practice-oriented nature of modules and disciplines when updating educational programs. This includes reviewing all types of practice to ensure the development of competencies such as (in descending order): achieving educational and upbringing goals in lessons; applying assessment results to improve teaching practice; creating a supportive atmosphere for each student; ensuring safe and ethical use of digital environments; motivating students to achieve high educational and upbringing results and supporting them; using teaching technologies by educational and upbringing goals, considering students' individual needs; adhering to academic integrity principles during assessment; interacting with parents/legal representatives to build individualized development paths for students; planning the educational process in line with educational and upbringing goals; using diverse assessment tools; providing timely and effective feedback on assessment results.

3) Professional Development: 99.5% of key terms related to professional development are at a low-frequency level, indicating that the development of professional growth competencies for teachers is not included in primary teacher training programs. This fact questions teachers' continued motivation for ongoing professional growth, which negatively impacts the overall quality of education.

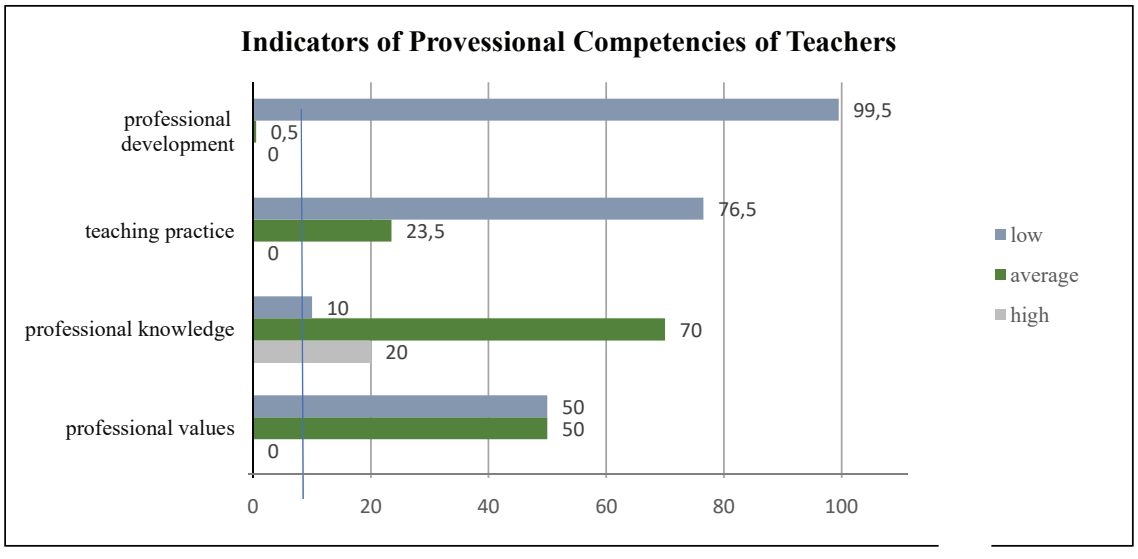

Figure 1: Data on Indicators of Professional Competencies of Teachers (%)

Discussion. This study continues the work of previous research (Shaukat, 2021; Li & Xue, 2023), highlighting the potential of standards to influence the quality of pedagogical education. By examining educational programs through the lens of key standards keywords, this study attempts to analyse how these programs are oriented toward ensuring the quality of teacher preparation. Additionally, the study adheres to the central idea of Tummons (2014), which posits that the Professional Standard serves primarily as a text, demonstrating intertextuality in its reading, dissemination, and citation processes.

This research represents an effort to develop and test a tool for assessing the quality of teacher preparation programs. We believe that the proposed methodology for analysing educational programs could serve as a roadmap for their development and evaluation (Burakgazi & Karsantik, 2023). The analysis of the programs has highlighted the existing issue of social and economic segregation (Irsalıev et al., 2020) among teachers at the stage of preparation in higher education institutions (Nousheen et al., 2024). Significant differences (more than 2 times) between the content of national university programs and those of regional and mono-city universities complicate planning and achieving sustainable development goals (Nousheen et al., 2024).

The proposed content analysis of program contents suggests that while adequate attention is given to subject knowledge and pedagogical content, the programs are insufficiently oriented toward preparing future teachers for practical responsibilities and certain skills (Al-Harthi et al., 2022; Sathasivam et al., 2024). For instance, the results of this study demonstrate a practical absence of key competency indicators related to future teachers' interactions with students' parents. Antony-Newman, (2024) underscores the pedagogical community's interest in this issue, noting that without a focus on parent involvement in teacher education, future teachers lack examples of such interactions and must demonstrate creativity in developing content for involving parents in their pedagogical practice, complicating their work.

The findings of this study, regarding the neglect by educational program developers of competency indicators from the standards, confirm a similar issue in other countries. Research by Willis et al., (2022) comparing the results of content analysis of educational programs with surveys of future teachers showed alignment with these findings. Future teachers lacked confidence in professional interactions with parents/caregivers, setting goals for students with varied experiences, implementing sequential lessons, engaging students in learning activities, and motivating them to learn.

According to the results of the Monitoring of Student Achievement (MODO) (Tynybaeva et al., 2022), it is recommended that pedagogical

universities expand opportunities for professional development for teachers, include courses on ICT and modern teaching methods, and establish closer collaboration between universities and schools regarding pedagogical practice, among other recommendations. MODO 2023 in Analiticheskii otchet, (2023) provided recommendations to regional education departments and methodological centres for organizing mutual teacher training on lesson planning, assignment development, and assessment of «weak» topics in students' functional literacy.

Based on the data obtained from the content analysis of teacher preparation programs and the studies on Monitoring Student Achievement (MODO) (Tynybaeva et al, 2022; Analiticheskii Otchet, 2023), it can be concluded that the development of competencies related to teaching practice and professional development is a nationwide issue in both teacher preparation and subsequent professional growth.

Research by Paulsrud & Nilholm (2023) and De Weerdt et al. (2024) emphasize that collaborative learning, teaching specialized educational consultations, and mixed forms of cooperation» are crucial in the professional development of educators. This highlights the importance of professional growth for teachers. However, the current practice of teacher preparation, where theoretical knowledge and pedagogical practice are implemented sequentially, does not provide novice teachers with the opportunity to reflect on their work, discuss their practical experiences with peers, receive feedback from university instructors, and apply alternative methods in subsequent school lessons (Sathasivam et al., 2024).

At the same time, from a socio-material perspective, standards are artifacts that can either intentionally direct or restrict the scope of evaluation (Ajjawi et al., 2021). These understanding positions standard as one of several tools for a comprehensive assessment of the quality of teacher education. In this context, the study has limitations related to the testing of a single evaluation tool and the number of programs analysed. In doing so, we recognize that, from a sociomaterial perspective, standards are artifacts that can purposefully guide or limit the scope of assessment (Ajjawi et al., 2021). This allows us to understand it as one of several tools for a comprehensive assessment of the quality of teacher education. In this context, the study has limitations in testing.

Conclusion. This study extends research on monitoring the implementation of the Professional Standard for Educators in educational organizations. The analysis identified the national university program as a leader in compliance with the Professional Standard for Teachers. This program contains over 50% (209 out of 400) of the total key terms. This finding is supported by the results of the independent Atameken ranking, which shows a positive trend in program quality satisfaction and career prospects for graduates. In all programs, knowledge-based components are predominant. The content analysis revealed an absence of key terms related to professional development in the programs, indicating that the programs are not aimed at developing professional development competencies for future primary school teachers.

The results obtained from the study suggest that universities should strengthen their focus on the study of criterion-based assessment, inclusive education, and self-development management. It is advisable to emphasize these areas during teaching practice. In schools, the mentoring process needs significant improvement, as does the training of young teachers in the development of methodological products and the sharing of experience. In analysing educational programs, we adhere to the view of scholars who emphasize that the effectiveness and quality of a university's activities, including its programs, are defined not only by compliance with set evaluation parameters but also by its ability to produce new values, goals, and standards in the field of education and science. In this regard, the results of the analysis do not claim to provide a comprehensive solution to existing problems. To ensure a comprehensive approach to solving issues in program development, further research may involve analysing programs in other areas of teacher preparation, including the use of multiple evaluation tools.

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IRSTI 14.07.09 10.51889/2960-1649.2024.61.4.014

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DEVELOPING DIGITAL COMPETENCE IN FUTURE TEACHERS THROUGH BLENDED LEARNING APPROACHES

Abstract

This article examines key aspects of training future teachers, focusing on the challenges of digitalizing education, the integration of digital competence, and pedagogical teaching methods. The study's article selection aimed to provide comprehensive coverage, utilizing the Web of Science database through a university library system. Keywords like «education,» «innovation,» and «digital competence» were used to find relevant research across various fields. The article's relevance stems from modern society's demand for well-qualified specialists in general education institutions. Future teachers must not only acquire vast knowledge but also apply it effectively in real-world scenarios. The curriculum for the 6B01505 «Biology Teacher Training» program, including the «Methods of Teaching Biology» course, is designed to incorporate new technologies and teaching methods that engage students and enhance their competencies. To support digital education, the MOODLE platform is used for developing materials such as presentations and video lectures, which align with the course objectives. Additionally, the article explores the role of educational platforms in facilitating effective lesson management and evaluates their services and impact on student learning.

Keywords: blended learning, digital competence, digital education, digital transformation, educational environment, interactive technologies.

Introduction. In the new century, in a time of huge technological advantages, computer services and the development of communication technologies have a positive impact on education in many different dimensions. The structuring of the information age has led to the development of new educational programs new professions and various interdisciplinary fields of knowledge. In today's digital age, the possibilities of digital tools in the speed of teaching and learning in education are increasing day by day (Peretti et al., 2024). Based on diagnostics of the level

of IT skills of teachers, a program for training teachers in digital skills will be developed and updated (The Government of the Republic of Qazaqstan, 2022).

The generation of the digital age is developing in parallel with the spread of Information Technology in all spheres of human life, which introduces a new aspect to the teaching of communication (Lu & Wang 2023). The transfer and storage of information is the activity of any person, which ultimately affects the digital competence of a person, whose communication activity is reflected in the educational environment.

In today's society, in an era of radical changes in the former traditional teaching content, the rapid development of Science and technology, and the intensification of the flow of information data, the main task of educational institutions is to develop the demand for digital competent teachers using new technologies, which has led to the need for new approaches to the integration of technologies in education (Galvis & Carvajal 2022; Lomos et al., 2023).

The law of the Republic of Kazakhstan «On Education» states that «the main task of the education system is to create the necessary conditions for education aimed at the formation and professional training of the individual based on national and universal values, achievements of Science and practice, the introduction of new teaching technologies, informatization of education, access to international global communication networks» (Educational Affairs, 2007). Currently, no sector of the economy can develop without the Internet. Therefore, the state program «Digital Kazakhstan» adopted in the country was considered as a means of actively developing human capital through efforts to digitalize, creating an innovative economy, and improving modern education for students (Government of the Republic of Kazakhstan, 2017).

President of the Republic of Kazakhstan Kassym-Jomart Tokayev, in his address to the people dated September 1, 2021 «People's unity and systemic reforms – a solid foundation for the country's prosperity», emphasized the importance of digitalization of Education, directly linking it with quality education and instructed to implement the educational project «Digital teacher» (Tokaev, 2021).

In the age of increasing the activity of digital technologies in the formation of digital competence of future biology teachers, which we are aiming for, its advanced capabilities are systematically studied by foreign and domestic scientists. In the age of full access to the world's media, the widespread use of digital technologies in the educational potential, communication with them should be adapted to the activity and get used to it.

Therefore, to form the digital competence of future biology teachers, within the framework of the University, the distance learning portal, MOODLE vertical system, was selected.

Theoretically substantiate and develop a methodology for the formation of digital competence of a future biology teacher in the conditions of mixed learning and experimentally prove its effectiveness. \The object of this research is the education system focused on developing digital competence in future biology teachers. The subject of the research is the methodology for cultivating digital competence in future biology teachers within the framework of blended learning. Objectives of the study are:

- to determine the scientific and theoretical foundations of forming the digital competence of the future biology teacher;
- development of a structural and content model for forming the digital competence of a future biology teacher;
- experimental testing of the effectiveness of the methodology for forming digital competence of the future biology teacher, implementation in the educational process.

If, through the theoretical principles of forming the digital competence of the future biology teacher, its structural and content model, and methodology are developed and integrated into the teaching process, then the digital competence of the future biology teacher is formed at a high level since in this case the information and communicative knowledge of the future biology teacher will expand and become the basis for implementation in educational activities.

Materials and methods. The formation of digital competencies in future biology teachers within a blended learning context has been the subject of study by philosophers, psychologists, and educators, contributing significantly to the current knowledge base. Among international researchers, several have made notable contributions to the understanding of blended learning and digital competence. Bonk and Graham (2012) explored the content of blended learning, while Demyanenko and Ermakova (2014) examined the combination of traditional and e-learning. Instefjord and Munthe (2017) focused on professional digital competence, and Howard et al. (2021) discussed digital competence as the expression of skills and knowledge. Additionally, Ilomäki et al. (2016) highlighted the importance of critically reading web pages as part of digital literacy.

The challenges of enhancing cognitive activity in the development of digital competence within blended learning have been addressed by various domestic researchers. Kasymova (2021) explores the foundational aspects of cognitive processes in blended learning, while Khalikova (2020) focuses on the current issues related to digital competence. Elibai et al. (2020) discuss the role of online courses as a tool for developing digital competence, and Alimov (2009) highlights the effectiveness of interactive methods in fostering digital skills. These studies contribute to a deeper understanding of how blended learning can support the formation of digital competence. As society evolves and digitalization intensifies, the demand for digitally competent teachers has evolved, creating the need for new approaches to integrating technology into education. Bonk and Graham (2012) distinguish three components of blended learning:

- traditional training-direct training in the form of offline classes in the presence of personal contact between students and the teacher;

- independent work of students- various independent activities (online search for tasks, web quest, etc.) without teacher's help;

- e-Learning-Collaborative Learning, which consists of completing various tasks on the network, and participating in webinars, online conferences, courses, etc. (Kasymova, 2021).

Blended learning is when students learn in a traditional classroom with a teacher using information technology tools; they can then meet with their teachers to discuss their assignments and get answers to their complex questions (Instefjord & Munthe, 2017).

«Mixed learning» - in the opinion of Demyanenko and Ermakovais (2014) a combination of traditional face-to-face learning and e-learning, in other words, the combination of traditional classroom lessons with it. They believe that the use of ICT tools in blended learning complements traditional learning and reduces the time students spend in Class (Howard et al., 2021). Instefjord & Munthe (2017) point out, that professional digital competence is the ability to integrate and use technology for educational purposes, which includes a general set of skills suitable for all situations, both personal and professional, as well as specific pedagogical - professional skills (Bonk & Graham 2012).

According to Howard et al., (2021), digital competence is the expression of digital skills and knowledge that is politically understood to fully participate in our increasingly evolving technological society (Kasymova, 2021). According to L.Ilomäki et al., (2016), digital literacy has been interpreted as the main synonym for digital competence with phrases such as computer use, critical reading of web pages, and understanding how to view digital images (Demyanenko and Ermakova 2014).

The formation of digital competence in the conditions of a digital educational environment is relevant in the educational process since the level of formation of this competence affects not only the effectiveness of obtaining knowledge by students of higher education but also their socialization and the development of the personality as a whole. Digital education is a modern technology that allows learners to make teaching high-quality and accessible, the education of the new millennium, is closely related to the use of the computer as a teaching tool, the Internet, and the educational environment.

Review of foreign practices identified in the field of studying the digital competence of a teacher in the work of the scientist Potemkina (2018):

- the direction developed in foreign studies related to the understanding, description, and structuring of the professional digital competence of a teacher testifies to the expansion of the content of his activities, changes in the requirements for training and conditions of professional development;

- due to the rapid development of the digital space, the unification of professional digital competencies of teachers is not universal and requires constant study and approval;

-taking into account innovative teaching tools that are actively developing in the digital educational environment and the existing provision that digital skills are based on the concepts of Information Literacy, a modern teacher must have a sufficiently high level of knowledge of information and communication technologies for mastering digital competencies (Instefjord & Munthe, 2017).

Digital transformation implies a new responsibility, and new role models in teaching because a graduate of educational institutions is in demand in the labor market in the context of the development of a new digital civilization (Howard et al., 2021). In the context of digitalization, the position of the student also changes, there is an opportunity to independently manage their knowledge, designing an individual curriculum, an individual variable educational program, including the resources of a virtual educational environment. The teacher, in the role of a tutor, or mentor, has the opportunity to provide mobile assistance to students using services and digital content, to provide advice, organize individual work, solve the problem of coordinating individual plans for the student, achieving the required educational results (Ilomäki et al., 2016).

The educational environment is the conditions for the formation of a personality according to a given model and a system of influence, as well as opportunities in the social and spatial-material environment necessary for its development. Yasvin (2001) interprets the educational environment as the conditions and system for the formation of a person according to the needs of society and also asserts that opportunities for its development have been created in the social and spatial-subject environment (Potemkina 2018).

Current digital changes in the world of industrial work, i.e. the developments of the «Fourth Industrial Revolution», require future professional teachers to have a multidisciplinary set of digital competencies consisting of specific knowledge, motivational aspects, cognitive abilities, and skills to meet the requirements of digitally interconnected working conditions (Shvab, 2017). In the opinion of Khalykova (2020), the transition of the education system to digital format requires guidance on two main issues:

- Formation of a digital educational environment (preparation of electronic educational resources, online training courses);

- The process of radical modernization of the educational process, which involves the training of specialists for life in a digital society based on a digital economy (Ustyuzhanina & Evsukov 2018).

If we use distance learning technology and open educational resources in the process of virtual learning in the works of Elibai et al., (2020) then such massive open online courses would be a good opportunity for teachers in the development and formation of didactic and digital competencies (Potemkina, 2018).

This part of the study describes the research method, the research study group, the data collection tool, the data collection process, and the data evaluation.

The study has been conducted in various universities of Kazakhstan, that is the educational program «Biology» of the South Kazakhstan State Pedagogical University Bachelor 3-4 courses (42 students), M. Auezov South Kazakhstan University educational program «Biology» 3rd year Bachelor students (20 students), the educational program «Biology» of the Central Asian innovative university students of the 3rd year of Bachelor's degree (10 students). In total, there were 72 students. In the content of the study, lessons taken on the online

MOODLE platform with offline traditional lessons were monitored and discussed. The stages of the formation of digital competence of future biology teachers are presented in Table 1.

Table 1. *Step-by-step methodological instruction on the formation of digital competence of future biology teachers*

Step	Tasks	Objectives
Before the experiment	Analysis of content on «educational content», «blended learning», «digital competence», «digital educational environment»	This study is aimed at making the problem more clear in the context of the digitalization of education, the methodological directions are presented in detail, the concepts of research are analyzed in philosophical, psychological, and pedagogical research, the main conclusions are guided, and the concept of the formation of the digital competence of the future biology teacher in the conditions of mixed learning is determined.
	Data research in the system of mixed learning education in forming digital competence	Various approaches to learning and philosophical assumptions in the conditions of mixed learning are analyzed. Approaches to learning before educational environments are research analyzed by main approaches to the formation of digital competence.
	Experimental method	The structural and content model for forming cognitive competence of students on the basis of mixed learning education, the principles of mixed learning, and the curriculum «Development of Biology in a digital educational environment» were analyzed and the distance learning part (http://moodle.okmpu.kz) MOODLE vertical system was selected.
During the experiment	Selection of the experiment object	South Kazakhstan State Pedagogical University, M. Auezov South Kazakhstan University, Central Asian Innovative University
	Performingtheexperiment	An experiment in the period from 2022 to 2023 was conducted for the educational program «Biology» of the South Kazakhstan State Pedagogical University 3 - 4th year students (42 St). M. Auezov South Kazakhstan University educational program «Biology» 3rd-year students (20 St). The educational program «Biology» of the Central Asian Innovation University students of the 3rd Year (10) students. In total, there were 72 students in the experimental group.
	Data collection	During each module, at the end of each practical task, information about students' digital competencies was analyzed and summarized for further comparison of learning outcomes in terms of digital development.
After the experiment	Digitaldataanalysis	An analysis of the services of the MOODLE vertical system was carried out to form the digital competencies of students in the context of blended learning. Its purpose is to measure the digital competence of students and provide an opportunity to test the scientific forecast of the study.
	Qualitative analysis of the obtained result	To find out if the students are satisfied with blended learning conditions a survey «Development of Biology in a Digital Educational Environment» has been conducted and analyzed. It was aimed at obtaining new ideas about students' desire for mixed-learning teaching materials to present further research issues and analyze the opinions of future biology teachers on using digital technologies in the education system.

The practice is formed by future biology teachers who voluntarily agreed to participate in the study. The demographic characteristics of biology teachers are presented in Table 2.

Table 2. *Demographic characteristics of future biology teachers*

№	Year	gender		total
		female	male	
1	3rd year	51	5	56
2	4the year	16	-	16
	Total:	67	5	72

Table 2 lists the gender and year division of future biology teachers who participated in the study. 46 future biology teachers are in the 3rd year and 16 are in the 4th year. 67 of the future teachers are women, and 5 are men.

The research data collection tool is a semi-structured interview form developed by researchers. In the process of creating a semi-structured interview form, a literature review was made. The opinion of two experts was heard to assess the compliance of the questions in the form of semi-structured interviews created as a result of the review of the literature with the content of the study. Various amendments were made by the opinions of experts. The final form of the semi-structured interview form is presented in Table 3.

Table 3. *Semi-Structured Interview form*

Demographic information				
Gender:	female		male	
Research group:	3rd. year	4the year	3rd year	4th year
Questions on blended learning and digital competencies				
What is your approach to a blended learning environment? Select one of the options below.				
I find it very useful				
I find it useful				
I find it quite useful				
I don't find it useful				
I don't think it's useful at all				
What is your approach to digital competence?				
I believe that digital competence is very sufficient				
I believe that digital competence is sufficient				
I believe that digital competence is little				
I believe that digital competence is not enough				
I believe that digital competence is completely insufficient				
What are your expectations regarding the digital competencies that will be created in a blended learning environment?				
Send your fe edback:_____				

The semi-structured interview form developed for collecting research data is presented in Table 3. In the form of a semi-structured interview, there are two questions to find out the gender and group distribution of future biology teachers. There are two closed questions and one open question on blended learning and digital competencies.

The research data was collected in a face-to-face interview with future biology teachers participating in the study. Interviews with future teachers were conducted at the University. During the interview, students had an opportunity to ask researchers about places they did not understand when filling out semi-structured interview forms. It took students about 25-30 minutes to

complete the semi-structured interview forms. It took about 1 month to complete interviews with all participants of the study.

In the analysis of the research data, the method of descriptive analysis was used. Descriptive analysis is a technique often used to obtain summary information about the various phenomena and events that researchers want to investigate. The main objective of descriptive analysis is to reach concepts and relationships that can explain the collected data. Descriptive analysis consists of four stages: building the basis of descriptive analysis; processing data according to the thematic framework; determining conclusions; and interpreting conclusions (Eysenbach & Köhler, 2002). By following these steps, the answers of future biology teachers participating in the study to questions in the form of semi-structured interviews were analyzed using the descriptive analysis method.

Results. In this section, the answers of participants of the study to questions in the form of a semi-structured interview are presented in tables in the form of frequency and percentage ratios. Table 4 evaluated the opinions of participants about the blended learning environment.

Table 4. *Views of future biology teachers on the blended learning environment*

Category	F	%
I find blended learning very useful	25	34,7
I find blended learning useful	34	47,2
I find blended learning quite useful	8	11,1
I do not find blended learning useful	4	5,6
I don't think it's useful at all	1	1,4
Total	72	100

Table 4 categorizes the opinions of the participants about the blended learning environment. 34.7% of students said «I find blended learning very useful», 47.2% said «I find blended learning useful», 11.1% said «I find blended learning quite useful», and 5.6% said, «I don't find blended learning useful for me». 1.4% replied» I don't think it is useful at all.» In this sense, it can be said that most of the future biology teachers involved in the study find the blended learning environment useful.

Table 5 evaluated the opinions of biology teachers who participated in the study about their digital competencies.

Table 5. *Opinions of biology teachers about their digital competencies*

Category	F	%
I believe that digital competence is very sufficient	15	20,8
I believe that digital competence is sufficient	24	33,4
I believe that digital competence is a little	18	25
I believe that digital competence is not enough	9	12,5
I believe that digital competence is completely insufficient	6	8,3
Total	**72**	**100**

Table 5 categorizes the opinions of biology teachers who participated in the study about their digital competencies. 20.8% of prospective teachers said «I believe that digital competence is very sufficient», 33.4% said «I believe that digital competence is sufficient», 25% said «I believe that digital competence is little», 12.5% said «I believe that digital competence is not enough» and 8.3% said, «I believe that digital competence is completely insufficient». In this sense, it can be said that most of the future biology teachers involved in the study consider their digital competencies to be somewhat adequate.

Discussion. The study shows that most future biology teachers participating in the program can effectively use digital technologies, enhancing their competencies through digital tools and creating applications that help students reinforce their understanding of biology within a digital context. Developing these skills is crucial for keeping up with and adapting to continuous innovations in educational technology.

The research underscores the importance of equipping future teachers with the ability to use innovative pedagogical tools, which play a key role in forming their digital skills. Interestingly, these tools have a positive impact on re-engaging students who might face challenges with traditional teaching methods or require additional time to grasp complex material. This trend highlights the growing need for digital competence in teacher education, as these skills enable future teachers to integrate new technologies effectively, contributing to the creation of blended learning environments.

The results reveal a need to enhance future teachers' digital competencies to meet diverse learning needs, showing that future teachers proficient in digital innovations are better prepared to engage students and meet the evolving demands of modern education.

Conclusion. In the age of new technologies, the future of our state – a young specialist, getting an education by the requirements of the time and promoting creative all-round development-requires deep search and benevolent actions from the teacher.

One of the main conceptual concepts used by the Bologna Process is the orientation of the process of acquiring knowledge to the result, the transformation of the result into the main function of the system of education and acquisition. The result of the educational process is what knowledge, skills, and abilities a graduate student acquires after completing a lesson, subject, program, full course of study, and what he can do.

In conclusion, the tasks of digital pedagogical technology have been implemented. They are as follows:

- ability to purposefully organize various activities of the future biology teacher for Education and development;
- education of a person who possesses knowledge, skills, and abilities;
- formation and development of skills of search work in the planned direction.

The social position, cultural position, political competence, and psychological state of the future specialist are determined by the acquired knowledge system, its level, and organizational activities.

Therefore, what students expect to increase their digital competence: is ease of learning, effective knowledge, use of time, satisfaction with the learning process, interest in learning, and continuous, learning from teachers with skillful experience. The only desire of today's specialists to get a quality education is the introduction of new innovative technologies in the educational process. The main task of the teacher is to integrate, process, and effectively use new pedagogical innovations and interactive methods, not lagging behind the developing scientific and technological progress.

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IRSTI 14.35.17 10.51889/2960-1649.2024.61.4.015

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PSYCHOLOGICAL WELL-BEING AS A COMPONENT OF FUTURE TEACHERS' PROFESSIONAL COMPETENCE: THE POTENTIAL OF VOLUNTEER ACTIVITIES

Abstract

This article examines the role of psychological well-being in the structure of future teachers' professional competence and opportunities for its development through volunteer activities. A review of foreign and domestic research revealing the relationship between psychological well-being and teachers' professional effectiveness has been conducted. The concepts of «teacher's psychological well-being», «professional competence», and «volunteering» have been analyzed. Psychological well-being is considered as a key component of teacher's professional resilience, affecting the quality of educational process and professional longevity. Volunteer activity is presented as an effective tool for developing psychological well-being of future teachers, contributing to the formation of emotional stability, professional identity, and social competence. An empirical study was conducted among 1st-4th year students of pedagogical specialties (N=425) to determine the relationship between involvement in volunteer activities and indicators of psychological well-being. The results demonstrate a positive correlation between participation in volunteer activities and the level of psychological well-being of future teachers. The main barriers preventing the effective use of volunteering as a tool for developing psychological well-being have been identified: insufficient awareness of volunteer activity directions and lack of practical experience in interacting with various categories of beneficiaries. Based on the obtained results, the necessity of developing a system of psychological and pedagogical support for volunteer activities of pedagogical students has been substantiated.

Keywords: teacher's psychological well-being, professional competence, emotional stability, volunteering, professional identity, higher pedagogical education.

Introduction. To date, many studies have revealed the undeniable importance of psychological well-being for productive work and self-efficacy of future teachers. However, much less is known about how the professional competence of future teachers affects the level of their psychological well-being. Because it is an important part in the development of professional competence of future teachers. In this regard, the formation of professional competence of future teachers is one of the priority aspects of modern higher education.

A modern university graduate should have innovative thinking, demonstrate a creative and reflective approach to professional activity, as well as be able to manage their resources (emotions, positive relationships with others, autonomy, environmental management, personal growth). These skills provide the ability to navigate the educational environment and solve practical problems. The professional competence of a teacher is largely determined by his willingness to apply innovative forms and methods of teaching, while maintaining his emotional health and positive attitude with others (Mashrabjonovich, 2023).

Thus, the Law of the Republic of Kazakhstan «On the status of a teacher» dated 27.12.2019 №293 emphasizes the importance of improving the quality of education and the social status of teachers. The teacher is considered as a cultural carrier, transmitting not only the necessary knowledge and skills, but also a worldview, ways of thinking, human

values and cultural guidelines (Zakon RK, 2019).

In this regard, the task arises – the study of psychological well-being as a component of the professional competence of future teachers and the search for an effective approach to its development.

One of the promising approaches in the development of professional competence of future teachers is the active involvement of students in volunteer activities. Since volunteering can be considered as a tool that helps reduce the risks of professional burnout, prevent disappointment in the chosen profession and the erroneous choice of a professional trajectory. In addition, such activities increase the competitiveness of graduates in the labor market, both in general and within their specialty, even at the stage of study at the university. Many students participate in volunteer activities to improve their career prospects (Kuz'minchuk, 2017). The above raises the question «How will the involvement of future teachers in volunteer activities contribute to the formation of professional competence and the preservation of psychological well-being?».

Materials and Methods. Our research is aimed at determining the impact of volunteer activity on the formation of professional competence of future teachers. In this section, we have conducted a content analysis of the available research on the above problem. The research included work with the database of the National Library of the Republic of Kazakhstan, the Scientific Electronic Library of Dissertations and Abstracts (dissercat), the Scopus database, Google Scholar and others.

During the research and the definition of content analysis, we analyzed the regulatory documents in the field of higher education of the Republic of Kazakhstan, foreign studies published in the Scopus database.

The main research methods were content analysis, synthesis, comparison, concretization, induction and deduction, generalization, experiment.

The purpose of our research is to study professional competence and determine the relationship between involvement in volunteer activities and indicators of psychological well-being of future teachers.

Research objectives:

- to study the theoretical foundations of psychological well-being as a component of the professional competence of a future teacher;
- to analyze the specifics of student volunteer activity in the educational process of the University;
- to develop and conduct a survey among future teachers to determine the degree of involvement of future teachers in volunteer activities.

To solve the first problem, we have analyzed the theoretical foundations of psychological well-being as a component of the professional competence of a future teacher. The research examines the works of foreign scientists such as V.A. Slastenin (Slastenin, 2013), L.F. Spirin (Spirin, 1994), J.M. Otajonova (Mashrabjonovich, 2023), I.Y. Krividina, E.Y. Petrova, T.V. Ershova, E.M. Kuzmina and Y.N. Yemelyanova (Mizambaeva, 2021), S. Antera (Antera, 2021), B. Adams, L. Thomas, M. Moens, M. Valcke (Adams et al., 2023), Sylvia Y.F. Tang, Angel K.Y. Wong, May M.H. Cheng (Sylvia et al., 2016). In these studies, the professional competence of teachers is analyzed in a general context, without reference to specific subject areas.

I.Y. Krividina defines the concept of «competence» as the presence of knowledge, awareness and authority in a certain area in a person. E.M. Kuzmina and Y.N. Yemelyanov introduce the term «professional pedagogical competence», defining it as a set of key skills of a teacher that effectively form scientific and practical knowledge for solving professional tasks.

Kazakh researchers such as K.S. Kudaibergenova, Sh.T. Taubayeva, B.T. Kenzhebekov, J.H. Salkhanova and J.M. Akparova pay special attention to the issues of professional competence formation. So, K.S. Kudaibergenova interprets «competence» as a person's awareness, his expertise in a certain field of knowledge (Kudaibergenova, 2008). Sh.T. Taubaeva considers competence as a personal characteristic based on knowledge

and experience acquired in the process of learning and socialization, and determining the general readiness and ability of an individual to take active action (Taubaeva, 2016). B.T. Kenzhebekov identifies types of professional competence, such as social, personal, individual and special competence (Kenjebekov, 2001). J.H. Salkhanova defines competence as an indicator of the level of knowledge within the education system, encompassing the extent of professional expertise and skills, personal attributes, aspiration for professional development, creativity, and a commitment to achieving high outcomes (Salhanova, 2013).

Based on this, the professional competence of a teacher is defined as a set of professional and personal characteristics that ensure the effective performance of pedagogical activities. A teacher who achieves high results in his professional activity can be considered professionally competent.

A key element in the formation of the professional competence of a future teacher, as noted earlier, is to receive a high-quality education. However, the modern education system is aimed not only at the transfer of knowledge, but above all at the development of psychological well-being and emotional stability among graduates. Because only a psychologically successful teacher is able to create comfortable and safe conditions for the development of new knowledge and skills. A teacher who is able to maintain emotional balance and not succumb to negative emotions in constantly changing conditions can provide a creative, developing, psychologically safe environment for self-development and development of his colleagues and pupils. A teacher can be considered psychologically successful if he is able to interact with all participants in the educational environment, and this is possible in the process of including future teachers in active social life.

One of the effective ways to develop students' social skills, in our opinion, is their involvement in volunteering. N.F. Basov notes: «volunteering provides an opportunity to gain social experience, get recommendations for career growth and further professional development». That is why the social phenomenon of student volunteering is becoming increasingly important in the public life of the country.

In the context of the social policy of the state, pedagogical education is considered as one of the priorities. This is due to the fact that pedagogical activity, including educational and educational functions, forms the ideological basis of civil society. The involvement of future teachers in volunteer activities contributes to the simultaneous solution of educational and educational tasks.

Pedagogical volunteering can be considered as a voluntary, gratuitous activity focused on solving the tasks of raising and educating children. In this context, the term «youth» refers to participants in pedagogical volunteering, since it is the most active social group in the field of volunteering, whose age ranges from 14 to 35 years and includes a wide range of educational levels.

Within the framework of this study, it is necessary to consider in more detail pedagogical volunteerism as an independent direction of volunteer activity among future teachers.

Special attention is paid to the works of foreign and domestic scientists such as E.V. Akimova, L.V. Dal (Dal', 2012), O.R. Danilova, S.G. Ekimova (Ekimova, 2010), V.R. Karimov, L.F. Kozodaeva (Kozodoeva, 2010), M.A. Maznichenko (Maznichenko et al., 2019), N.V. Makovey, A.V. Mitrokhina, A.V. Morov, L.V. Nikitina, A.R. Rymkhanova, S.K. Abildina, R.K. Dyusembinova, A.A. Ryskulova (Rymhanova et al., 2021) who emphasize the importance of volunteerism among students, Researchers note the significant potential of volunteerism in the processes of socialization, personal development and its role in the professional development of future teachers.

The function of professional development is to involve students in independent work, awareness of the social significance of the future profession, the value of work and its social benefits, as well as in the formation of respect for work and the acquisition of practical skills of professional activity. That is why many researchers consider volunteering not only

as a positive social experience, but also as an important element in the system of professional training of future teachers. Volunteering provides students with the opportunity to gain practical experience, which is based not on mandatory academic requirements, but on personal initiative and free choice. In addition, the function of professional development is closely related to the choice of the direction of volunteer activity, which contributes to a deeper connection of theoretical knowledge with real practice (Lyashenko, 2023).

In the structure of pedagogical universities, it is advisable to single out volunteer students as a separate unit of student associations. For the effective functioning of this structure, it is necessary to provide support from the university administration, which can create conditions conducive to its development. The main participants in this direction can be students from 1st to 4th year.

The target audience of pedagogical volunteering includes children in need of pedagogical support, as well as age groups of different ages. The main organizational form of this activity is a voluntary association of student teachers involved in the development and implementation of medium- and long-term educational projects.

Voluntary engagement of students in pedagogical volunteering during their professional training facilitates the development of their understanding of the motives and personal significance of professional activity. Involvement in practical tasks allows students to gain deeper insights into the specifics of the educational process, identify potential risks, and evaluate their own capabilities in alignment with the demands of professional practice. This experience enables students to apply their theoretical knowledge and skills in pedagogy and psychology, address gaps in their theoretical preparation, and compensate for a lack of practical experience through participation in non-formal education and direct interaction with children.

Taking into account the above-mentioned potential of pedagogical volunteerism as an independent direction of student volunteerism, the research group faces the need to develop a survey to determine the degree of involvement of future teachers in volunteer activities.

Results and discussion. To solve the third task, in order to determine the impact of participation in volunteer activities on the formation of professional competence, a survey was developed and conducted among future teachers. The survey was attended by students of the 1st-4th year (N=425) of the educational programs «Pedagogy and Psychology», «Psychology», «Special pedagogy», «Training of psychologists-consultants in the social field».

The purpose of the survey is to determine the degree of involvement of future teachers in volunteer activities.

Survey tasks:

- to determine the motives of students' choice of volunteer activity;
- to determine the respondents' attitude towards children in need of pedagogical support;
- to identify the experience of volunteering.

During the survey, the questionnaire of M.I. Lyashenko (Lyashenko, 2023) was adapted, consisting of 11 questions reflecting the degree of student involvement in volunteering and determining its impact on the formation of professional competence. The questions are divided into the following categories: motive, attitude, prospects.

The results of the survey «The degree of involvement of future teachers in volunteer activities» are presented in Table 1.

Table 1. *Results of the survey «The degree of involvement of future teachers in volunteer activities»*

Survey categories	The number of responses, % of the response ratio
Do you have any volunteer experience?	yes 70 / 70% no 30 / 30%
If yes, how long have you been involved in volunteering?	less than 6 months 45 / 64% 6 months – 1 year 20 / 29% more than 1 year 5 / 7%

In what field do you participate in volunteer activities?	working with children 35 / 51% social assistance (for the elderly, persons with SEN) 15 / 21% educational projects 5 / 7% environmental actions 10 / 14% other (specify) 5 / 7%
What principles, in your opinion, are the leading ones in volunteering?	gratuitousness 20 / 20% self - improvement 5 / 5% voluntary 50 / 50% observance of human rights and freedoms 5 / 5% openness, accessibility of information about volunteer activities 10 / 10% tolerance 8 / 8% other (specify) 2 / 2%
What do you think attracts a person to participate in volunteer activities?	the opportunity to get useful contacts, contacts 3 / 3% the desire to overcome the feeling of loneliness 5/ 5% the desire to be needed by someone 7 / 7% help for those in need 45 / 45% asked to participate, friends invited 5 / 5% realization of their interests 3 / 3% the opportunity to gain experience in the field of future professional activity 32 / 32%
What motivates (or perhaps motivates) Are you interested in volunteering?	I wish to be useful to society 12 / 12% I want to share with others what I can do 7 / 7% I'm looking for a way to «kill» my free time 2 / 2% I hope to gain the experience necessary for professional activity 56 / 56% I want to gain a sense of self - confidence 10 / 10% The desire to work on your shortcomings 10 / 10% I'm going to volunteer with friends «for the company» 3 / 3%
What can make you refuse to participate in volunteer activities?	I don't like the team 13 / 13% there is no opportunity for self-realization 15 / 15% takes too much time 40 / 40% not interesting and boring 5 / 5% lack of encouragement for work 12 / 12% understanding that I am not competent enough to provide assistance 15 / 15%
How do you assess the impact of volunteering?	participating in volunteer activities helped me to better understand the age characteristics of children 8 / 11% volunteering contributes to the development of my communication skills 10 / 14% I feel that I have become more confident in my professional skills thanks to volunteering 12 / 18% learned to adapt to different situations and find solutions in difficult conditions 8 / 11% participation in volunteering strengthens my motivation for the teaching profession 32 / 46%
What skills have you developed most (will help you develop) through volunteering?	communication skills 35 / 35% organizational skills 11 / 11% teamwork skills 14 / 14% pedagogical abilities 25 / 25% psychological stability 15 / 15%
What do you think is the main benefit of volunteering for the professional development of a teacher?	development of practical skills 42 / 42% self - confidence boost 18 / 18% the formation of empathy and tolerance 10 / 10% awareness of the importance of the profession 30 / 30% other (specify)

Would you like volunteering to be included in the educational program as a mandatory component?	yes 85 / 85% no 5 / 5% I find it difficult to answer 10 / 10%

According to Table 1, according to the results of a survey conducted with students of the 1st-4th year of the educational program «Pedagogy and Psychology», «Psychology», «Special pedagogy», «Training of psychologists-consultants in the social field», we see small discrepancies in percentage indicators, i.e. there are answers from 425 and 297 respondents, this is due to the fact that only 70% answered the question that they have practical experience in volunteering, and 30% do not have.

Interpretation of the results: in general, students have an idea of the main activity of the volunteer, so the majority, namely 70%, have experience, albeit small, including less than 6 months (64%), which suggests the fact that most joined this academic year. According to the respondents, the main area of volunteer activity is related to children (51%) and social assistance (21%), which involves providing pedagogical and psychological support to children who find themselves in different life situations. In order to determine the leading principle of volunteering, according to the students, the majority noted «voluntary» (50%), «gratuitousness» (20%). To identify the motivation behind participation in volunteer activities, the primary reason cited was «help for those in need» (45%), followed by the perception that volunteering offers a valuable opportunity to gain experience relevant to future professional activities (32%). Additionally, acknowledging that some respondents might not currently be engaged in volunteering or may have ceased their involvement, a question was posed to explore potential reasons for discontinuing volunteering. The most frequent response was «takes too much time» (40%), while 15% indicated reasons such as «there is no opportunity for self-realization» or « understanding that I am not competent enough to provide assistance,» which primarily reflect self-assessment of their professional capabilities.

Among the respondents who were previously engaged in or are currently part of the league of volunteers, a question was asked about the impact of volunteering. According to the responses of 297 respondents, among whom 46% say that volunteering strengthens their motivation for the teaching profession, 18% feel that they have become more confident in their professional skills thanks to volunteering. In response to the question «What skills does volunteering allow you to develop?» the majority, namely 35%, noted «communication skills», since there is active interaction with society, the study of different life situations; 25% noted «pedagogical abilities», i.e. in the process of volunteering, future teachers develop independence skills, have the opportunity to study the psychological portrait of children and provide psychological and pedagogical support to families with certain difficulties. In order to determine the benefits of volunteering for the professional development of a teacher, the majority, namely 42%, answered the development of practical skills, 30% believe that this activity makes it possible to realize the importance of the profession, especially in the first year, when students go through the stage of adaptation and there is a question about the correctness of choosing their profession. In conclusion, the question was asked «is there a need to include volunteering in the educational program as a mandatory component?» 85% answered positively, based on the fact that their future professional activity is connected with society, and volunteering provides an opportunity for professional self-development.

The survey results indicate that future teachers exhibit a positive attitude toward volunteering. However, this serves not as a definitive conclusion but rather as an assessment of the extent of their involvement in volunteer activities. Further exploration should encompass the participation of future teachers in other forms of pedagogical volunteering, such as individual mentoring and providing educational support for children. This necessitates the creation of alternative models

and mechanisms aimed at fostering the personal and professional development of students in pedagogical universities. Additionally, it requires the implementation of diagnostic and monitoring tools to evaluate the effectiveness of volunteer activities in the context of developing professional competence.

Conclusion. The analysis of psychological and pedagogical literature and the results of the survey confirm that pedagogical volunteering, as an element of non-formal education, provides future teachers with the opportunity to independently participate in activities close to professional. Such activities give students the opportunity to prove themselves in several key roles: as a subject of educational influence on children in need of pedagogical support; as a participant in personal and professional self-development in the field of education; as an initiator of the formation and development of a volunteer team of future teachers; as well as a subject of interaction with other participants in the educational process, such as parents and social partners. The survey results show that students are aware of the importance of volunteering, but face a number of difficulties. Among them, there is a lack of knowledge of the areas of volunteer activity and a lack of practical experience in interacting with various categories of people in need of help. This indicates the need to develop a special system of measures and regular work in this direction.

The active involvement of students in volunteer activities will contribute to the creation of conditions for their personal and professional development, while maintaining psychological well-being. Volunteering is becoming an important component of the professional training of future teachers, enriching their experience with new social content. In addition, such activities contribute to the education of students of moral qualities, which they will later be able to pass on to the next generations of citizens of Kazakhstan.

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IRSTI 14.35.07 10.51889/2960-1649.2024.61.4.004

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PEDAGOGICAL POTENTIAL OF INSTAGRAM IN TEACHING STUDENTS: ANALYSIS OF EDUCATIONAL DIMENSIONS

Abstract

This article presents a learning and teaching experience built on a project-based learning approach using Instagram as an educational tool to improve students' skills and increase their interest in English for Specific Purposes classrooms. Therefore, this study aims to investigate the impact of Instagram-based activities on ESP learning among higher education science (chemistry and biology) students and ascertain their attitudes toward this approach. The research is a mixed method in nature and uses questionnaires from 49 freshmen chemistry and biology students at a higher institution to understand their perception of social media tasks in ESP learning. The researchers selected Instagram as the platform for project work, aiming to improve students' ICT, communication, organization, research, self-reflection, and group work skills. Content analysis and student survey responses were analyzed to evaluate the project's effectiveness. Pearson correlation coefficient was calculated to measure the strength and direction of the linear relationship between two variables.

Keywords: Social Med Social media, English for Specific Purposes (ESP), Higher Education (HE), Project Work.

Introduction. Today's generation is aware of websites and applications that allow users to create and share content or participate in social networks. Currently, social networks authorize students to split anything to participate in academic subjects. Social media is not a limited resource; its knowledge and information will increase every year. It is an exciting, competitive way to teach students from all over the world without getting lost, with huge exposure resources. The platform variables have been expanded using super-technologies and interests, and they can interact with the audience in a completely convenient way. For a person who studies at a university or other higher education institution, social networks have played a vital role in their lives in recent decades. Through social networks, students can connect with peers and professors, access educational resources, and participate in online discussions (Alfadda et al., 2022; Ibrahim & Basim 2024). Additionally, social networks provide a platform for students to showcase their skills and network with potential employers.

Teaching English for Specific Purposes (ESP) is based on approaches that integrate effective concepts from various theories into a single system. It has unique features such as learner-centeredness, correlation with specialized subjects, and emphasis on both designing and educating (Richards and Rodger, 2014). The necessity to reassess the methodology of English language instruction and tailor it to the unique context of academic settings is evident from my experiences in teaching specialized foreign languages in Kazakhstan and internationally. Undoubtedly, the adoption of new approaches requires significant effort and time; however, it is crucial for English language instruction to be well-received and yield desirable outcomes (Tleuzhanova et al., 2021). At the same time, competency refers to the skills, talent, and ability to do something, and a competency-based curriculum is developed on the grounds of basic competency standards, that include well-planned learning objectives and end outcomes. Thus, the outcome-oriented method has become a dominant curriculum design model in higher education (Killen, 2000), and ESP is no exception. The competency-based approach in education began due to socio-economic alterations and is now widely used in the majority of countries.

Linguistic knowledge should be determined by what an individual is capable of performing with learned and acquired information. The learner-centred approach has had a great impact on contemporary foreign language education where transmission has occurred from teacher to the learner. According to Nunan (2012), experiential learning is gaining popularity where students are transmitted to the center of the educational process. A well-designed competency-based curriculum is focused on what students can do at the end of the course, not on what they should know (Mosha, 2012).

Meanwhile, the use of technology in language teaching and learning has become more important in recent years, particularly during the COVID-19 pandemic, which forced many educational institutions to switch to remote learning modalities (Shadiev and Yang, 2020; Kamasak et al., 2021; Lavrinenko, 2022; Lei et al., 2022). As a result, mobile-assisted language learning (MALL) has gained more attention, and social networking tools have been used to facilitate language acquisition (Gonulal, 2019; Wrigglesworth, 2020; Ahmadi, 2021). Erarslan (2019) and Tavassoli & Beyranvand (2023) state that among social networking platforms, Instagram has attracted significant attention due to its popularity and potential for language learning. Instagram can be used as a source of several activities in language classrooms such as digital storytelling, grammar activities through photos, role plays, reading, and speaking activities through videos (Devana and Afifah, 2021). Soviyah and Etikaningsih (2018) and Meirbekov et al., (2023) asserted that Instagram can influence learners' autonomy, motivation, self-assessment, group work, and academic achievement which is the main description of competency-based education.

Because of its visual and contextual information, socially connected network of learners, remark and tagging functionality, and mobile application sharing capabilities (Ellison, 2017), Instagram has grown in popularity as

a medium for language teaching and learning (Persikova, 2017; Yang, 2021). Recent studies have shown that using Instagram to learn languages successfully improves learners' language skills and motivation to learn (Pujiati & Tamela 2019). It offers a dynamic language exposure that is crucial for successful language acquisition. Instagram may be used to practice speaking through both short and extended videos (Devana and Afifah, 2021) and writing through text messaging. Due to its image- and video-based resources, it is also a good resource for practicing grammar and vocabulary (Rasyiid et al., 2021). The use of Instagram as a teaching and learning tool has become increasingly popular in recent years, particularly in language instruction (Gómez-Ortiz et al., 2023). Thus, the use of Instagram as a teaching and learning tool has become more and more common lately, particularly in language instruction.

Although there have been some studies on the use of Instagram in language instruction, there have been far fewer studies on its usage in ESP classes, particularly in undergraduate scientific (chemistry and biology) programs. To help students build a variety of abilities and advance their professional profiles and careers through competency-based professional development, this pedagogical piece presents a learning and teaching experience using Instagram accounts for chemistry and biology (Gómez-Ortiz et al., 2023). Therefore, the purpose of this study was to examine the impact of Instagram-based activities on ESP learning among science university students and to ascertain their opinions of this methodology. The study can shed light on how technology-based training is used in language learning and help create modern language teaching methods that are efficient. The article aims to unveil students' opinions on the use of Instagram in the ESP classroom and contribute to the evolving field of ESP teaching and learning in the digital age. This study seeks to answer the following research question:

RQ1. What are chemistry and biology learners' perceptions of using social media-based tasks in learning ESP?

RQ2. To what extent is Instagram-based learning effective in acquiring competency-based skills such as ICT, communication, organization, research, self-reflection, and group work among chemistry and biology learners?

Materials and methods. This study is a mixed method in nature and uses questionnaires from 49 freshmen chemistry and biology students at SDU University in Kazakhstan. According to the educational curriculum for chemistry and biology majors, students had to take ESP courses in both semesters of one academic year, that is 90 contact lessons in total. The questionnaire was conducted to answer the first research question about chemistry and biology students' perception of social media tasks in ESP learning. The participants were pre-intermediate and intermediate level of English proficiency ranging from 18 to 19 years old. The researchers then analyzed the questionnaire results to determine the most popular social media platforms and student interest in using social media for learning. After some haggling with the students, Instagram was selected as the project work medium. Students worked in groups over 10-12 weeks to create Instagram channels focused on science topics of their choice. At the end of the project, students presented their channels to peers.

Then to answer the second research question, researchers conducted a content analysis of one of the Instagram channels, «vdna_project» to determine how well the channel aligned with learning outcomes given in evaluation criteria such as ICT, communication, organization, research, self-reflection, and group work skills. The researchers mapped the content of the 30 posts in the channel to the learning outcomes and also analyzed student survey responses related to their experiences after the completion of the Instagram projects by examining the mean scores and standard deviation (SD) for each question to determine which learning outcomes were most improved. Furthermore, the Pearson correlation coefficient was calculated to measure the strength and direction of the linear relationship between two variables.

Results. *1. Students' attitude towards social media*. This research aimed to examine the

effectiveness of Instagram-based learning in developing students' skills in the ESP course. The first step is to find out science students' perceptions of social media and the possibility of utilizing this method for educational purposes. The obtained questionnaire results from chemistry and biology students are presented in Table 1-2 and Figure 1.

Table 1. *The age range of chemistry and biology students*

Age range	n	Percentage
18 years old	47	95.9%
19 years old	2	4.1%
Total	49	100%

Based on Table 1 the majority of respondents 95.5% were 18-year-old students and only 4.1% were 19 years old.

Derived from the data provided in Table 2, it can be concluded that the majority of students spend some amount of time on social networking sites during the day, with only 10.2% of respondents indicating that they do not spend any time on social media at all. The majority of students spend between 1-5 hours with the highest percentage of students (24.5%) spending 5 or more hours per day. Given results show that the majority of students use social networking sites for varying lengths of time daily, it suggests that using social media-based tasks in learning ESP could be an effective way to engage students in the learning process.

Such tasks could include using social media platforms like Instagram or Telegram to share and discuss scientific articles, participating in online discussion forums related to the course content, or even creating multimedia presentations for class projects.

Table 2. *Time spent on social media per day by chemistry and biology students*

Time Spent	n	Percentage
None	5	10.2%
0-5 minutes	0	0%
5-10 minutes	0	0%
10-30 minutes	1	2%
30 minutes to an hour	1	2%
1-2 hours	7	14.3%
2-3 hours	5	10.20%
3-4 hours	9	18.40%
4-5 hours	10	20.40%
5+ hours	12	24.50%
Total	49	100%

In light of this, the next query focuses on identifying the social media sites that students utilize the most.

According to the bar graph above, Instagram, YouTube, and Telegram are the three social media networks most frequently used by chemistry and biology students. Students use YouTube, Telegram, and Instagram in proportions of 91.8%, 79.6%, and 20.4%, respectively. This suggests that, among students, Instagram, Telegram, and YouTube are the three most popular social media platforms. Due to their popularity, these three websites might be especially helpful for developing social media-based projects in ESP learning. The last query asks whether or not students are interested in using social media as a teaching tool in ESP classes. The responses are as follows:

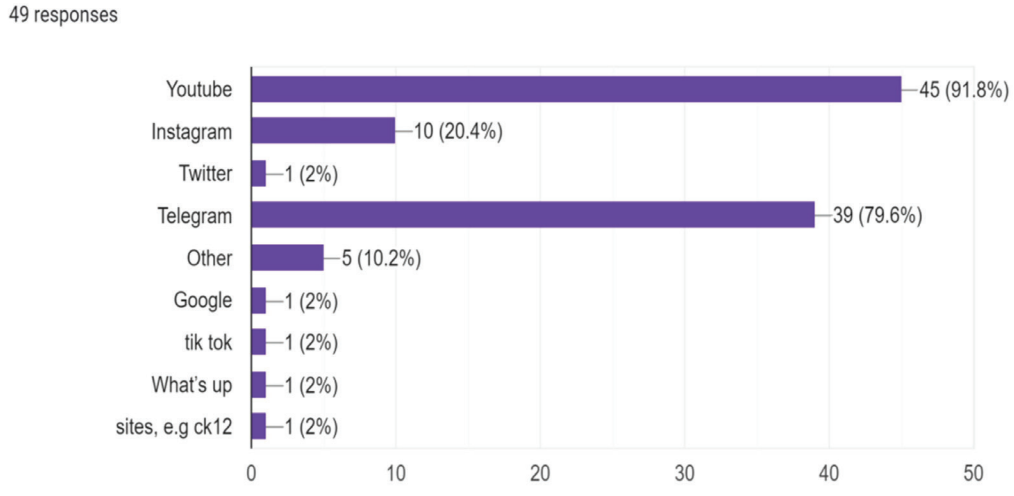

Figure 1: Which social platform do you mostly use?

Table 3. *Attitudes of chemistry and biology students toward using social media as an educational tool in ESP classes*

Responses	n	Percentage
Yes	41	83.7%
No	8	16.3%

Only a small minority (16.3%) of students express reluctance about using social media as a teaching tool in ESP classes, while the majority of students (83.7%) are enthusiastic about it. This suggests that incorporating social media into language learning may be a promising approach to engage students and enhance their language skills. As stated in the study findings, social media-based learning tasks for ESP students are a practical choice for involving them in the learning process. Students studying chemistry and biology tend to frequent YouTube, Telegram, and Instagram the most. One of these websites can help develop social media-related projects. However, it is important for educators to carefully design and implement social media-based activities that align with the learning outcomes and address potential privacy and safety concerns.

2. Instagram-Based Assignment. The next step is to assign social media-based tasks to chemistry and biology students. One of the learning outcomes in the ESP course for chemistry and biology students sounds like 'By the end of the course, students will be able **to create** project work by providing personal information collected in 10-12-week time'. Thus, after obtaining the questionnaire results presented above it was negotiated by students to choose Instagram as a tool for their long-term project. Sometimes basic knowledge and vocabulary are not enough and students need to know how to apply the information and vocabulary they acquired in real-world situations. Creating project work was a lot of fun for students. The project aimed to allow students to experiment with developing knowledge in the science sphere (chemistry_ biology) through creating and designing their products. Students researched the topics that would be suitable, interesting, and useful for the targeted audience and for themselves in the English language. Once students have worked through the project, they leave the class with the background knowledge in their professional field. This personal and scientific knowledge that is gained will always need to be received and updated, but having thoughtful plans, and ideas, feeling empowered and even proud of final work. Creating and designing educational pages requires actively participating and completing assignments on time. Project work should cover topics that are designed to draw the audience's attention to science subjects and

involve activities to motivate and interest other students to learn more about their profession.

Throughout the process, students learned 21st-century skills, as well as the basics of personal interests. These skills included information and communication technology (ICT), communication and presentation, organization and management, research and inquiry, self-assessment and reflection, and group participation and leadership skills.

The procedure for conducting a project work was as follows: One group was divided into several subgroups of 4 - 6 students each. Students were divided into groups by Perfect Pick App and those who were selected in the same team were considered as one team member, and acted on the principle 'one for all and all for one'. The student's work was tracked in a weekly report in the teacher's office hours' time. Each group had to submit a report about the work they completed or not, the progress, difficulties, or any type of information regarding the project work. Project work was given 20 points making up 10% of the final examination mark.

To evaluate the skills mentioned above, the evaluation criteria of the project work (Raikhanova and Kassymova, 2019) are presented in Table 4 below.

Table 4. *Evaluation criteria of the project work*

Desired Skills	Required Abilities	Points
Information and communication technology (ICT)	Ability to effectively use various technology tools and software, create and edit documents, presentations, and spreadsheets, and navigate the internet and social media	4
Communication and presentation	Ability to effectively convey information through various forms of communication, such as written and oral, and deliver engaging and informative presentations	4
Organization and management	Ability to plan and prioritize tasks, manage time effectively, and organize resources efficiently	4
Research skills and group participation	Ability to conduct research, gather and analyze data, synthesize information, effectively participate in group activities, collaborate with others	4
Self-assessment and reflection	Ability to reflect on personal strengths and weaknesses, set goals for self-improvement, and evaluate personal progress	4

Students completed the assignments weekly using the personal information that they collected in 10 (12)– weeks and checking the track with the checklist as follow: My project is creative and original; I have my work done and I have all of my materials; Our team knows what work needs to be done and has divided up the work fairly; My presentation will demonstrate my knowledge of the subject matter; My project relates to the topic and includes accurate facts, supporting details, and high-quality examples.

Students had to choose interesting topics to complete the project throughout the semester. They were able to add any activities they liked while creating their channel on Instagram. Students were given total autonomy in deciding the name of the channel, design, and content.

Following the given procedure at the end of the term students presented their Instagram project work channels. They are called all_about_water, human_phys_sdu, virus_nerd, vitamins_chembio, and vdna_project. Further, the description of each channel is given (see Figure 2).

Information about water, including its characteristics, daily consumption, ideal timing, and World Water Day, can be found on the «all_about_water» Instagram channel. The channel discusses the advantages of water for the bones, skin, intestines, blood, kidneys, stomach, heart, lungs, and brain, among other body parts. It also addresses topics like storms, tsunamis, water shortages, and melting glaciers. Water use, weight loss, the water cycle, rain formation, cold and warm water, the effects of

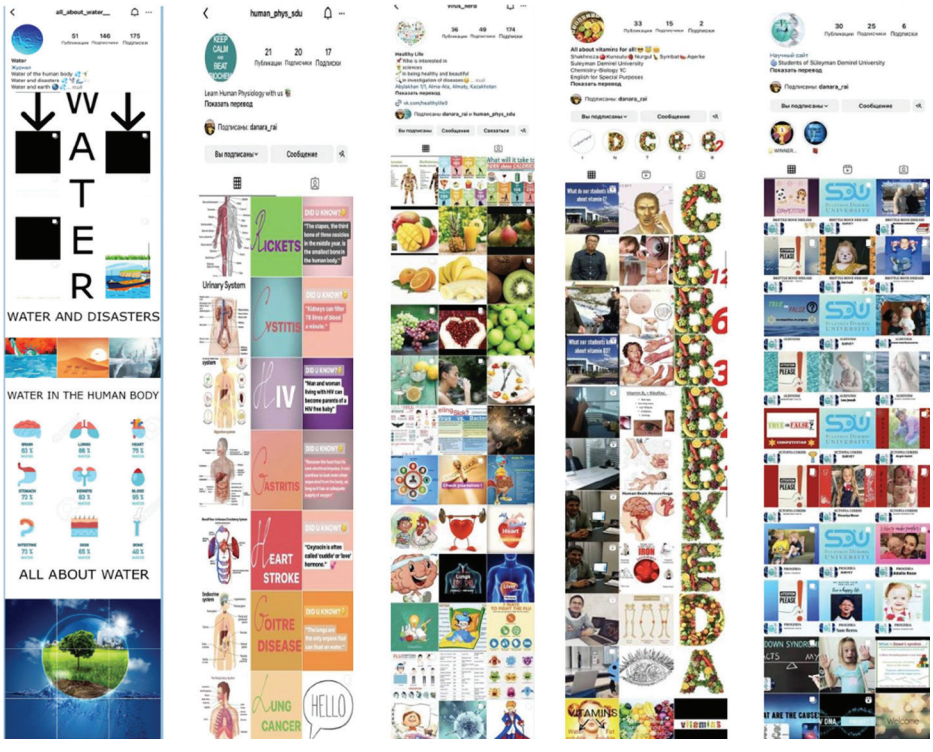

Figure 2: Scan version reviews on Instagram channels conducted by students

an empty stomach, and water pollution are all topics covered in the animated videos on the channel.

The Instagram account «human_phys_sdu» provides a thorough understanding of human physiology, including organs and cells. It covers vital organs and diseases like lung cancer, goiter, heart attacks, strokes, gastritis, HIV, cystitis, and rickets as well as vital systems like the immune, neurological, digestive, respiratory, circulatory, and endocrine systems. Three categories make up the channel: fascinating information, disorders, and a thorough examination of the major bodily systems. Each article has a glossary and clear illustrations to make it simple to understand.

An Instagram project called «virus_nerd» gives users a thorough rundown of ailments brought on by bacteria or viruses, as well as information on nutrition and treatment options. The channel emphasizes the value of a well-balanced diet for overall well-being and offers details on the nutrients that are crucial for optimum health. It is intended for those who want to improve their vocabulary and are interested in science and health.

The «vitamins_chembio» Instagram project provides details on vital vitamins to support healthy bodily function. Three sections make up the channel: a thorough explanation of each vitamin, its significance for the body, and potential disorders brought on by a deficiency. It also includes videos with advice on maintaining a balanced diet and comprehending the value of vitamins from college students, faculty deans, and biology professors. The project successfully introduces viewers to challenging scientific ideas and offers a thorough manual for maintaining bodily health.

The “vdna_project” is an Instagram channel that educates young people about genetic disorders and their causes without requiring biology or science background. The channel, named «V» meaning «within,» provides background information, real-life examples, and important information for each condition. It also offers games, exercises, and video surveys to test audience understanding. The channel effectively introduces complex scientific concepts to a larger audience through real-life examples and interactive activities.

3. Content Analysis and Alignment between Learning Outcomes and Content of Instagram Channel. A content analysis of the vdna_project channel was conducted to address the second

research question. A content analysis is a technique for carefully analyzing and describing the material to determine how it relates to the targeted learning outcomes. Desired Outcomes are Information and Communication Technology (ICT) Skills; Communication and Presentation Skills; Organization and Management Skills; Research and Inquiry Skills; Self-Assessment and Reflection Skills and Group Participation and Leadership Skills. The content of the channel was sorted based on the posts uploaded by chemistry and biology students on Instagram as follows:

1. Introduction to the Channel and its Aim;
2. Explanation of Genetic Disorders, their Causes, and Prevention;
3. Explanation of the Structure of DNA and Mutations;
4. Explanation of Down Syndrome;
5. Video Post about a Little Girl Sofia with Down Syndrome;
6. Explanation of Myths and Truths Related to Down Syndrome;
7. Explanation of Progeria Disease;
8. Video and Story of a Teenager Sam Bern's Struggling with Progeria Disease;
9. Explanation of Facts about Progeria Disease;
10. Video Post about a Famous 11-year-old YouTuber Adalia with Progeria;
11. Survey Conducted on University Students about Progeria Disease;
12. Explanation of Ectopia Cordis Disease;
13. Video Post about a Girl Virsaviya Suffering from Ectopia Cordis Disease;
14. Explanation of Important Facts about Ectopia Cordis Disease;
15. Video and Story of a Young Man Arpit Gohil Struggling with Ectopia Cordis Disease;
16. Survey Conducted on Students about Ectopia Cordis Disease;
17. True or False Game for Followers;
18. Explanation of Albinism Disease;
19. Video Post about a Young Man Leo with Albinism;
20. Explanation of Important Facts about Albinism Disease;
21. Video Post about a Unique Compatriot Baby Dilnaz with Albinism;
22. Survey Conducted on Students about Albinism Disease;
23. True or False Game for Followers;
24. Explanation of Brittle Bone Disease;
25. Video Series about a Little Girl Zoe Lush with Brittle Bone Disease;
26. Explanation of Important Facts about Brittle Bone Disease;
27. Video and Story of a Young Compatriot Man Struggling with Brittle Bone Disease;
28. Survey Conducted on Students about Brittle Bone Disease;
29. True or False Game for Followers.

Now it is important to make an alignment between desired outcomes and channel content.

Table 5. *Alignment between desired skills and the channel content*

Desired Skills	Content of the "vdna_project" Instagram Channel
1. Information and Communication Technology (ICT) Skills	Learners use Instagram to create, upload, and share content related to genetic disorders, such as posts, videos, surveys, and games. Students also learn to select appropriate programs for editing materials, videos, and sound systems.
2. Communication and Presentation Skills	Learners create content that effectively conveys information about genetic disorders to the target audience, using language and media appropriate for the platform. At the end of the project, students have to present their channel to other students.
3. Organization and Management Skills	Learners plan and implement a long-term project that involves researching and presenting information about genetic disorders in a structured and organized manner, using tools such as project timelines and task lists.

4. Research and Inquiry Skills	Learners research various genetic disorders and present information clearly and concisely, using credible sources and scientific terminology. One of the members of this project Student N published an article on the topic: "Effectiveness of using the educational pages on social media for school students" in a student conference book entitled «Development and Prospects of Science of Kazakhstan through the Eyes of Youth», SDU.
5. Self-Assessment and Reflection Skills	Learners reflect on their project work and identify areas for improvement, such as content quality, communication effectiveness, and relevance to the target audience every week reporting the results to the instructor.
6. Group Participation and Leadership Skills	Learners work collaboratively with peers to create and share content about genetic disorders, taking on various roles and responsibilities, such as content creation, editing, and review.

The project described in the summary focuses on using Instagram as a platform for learning about genetic disorders. The project aims to develop a range of skills among learners, including ICT skills (Kassymova et.al., 2023; Hidayati et al., 2023) for creating and editing content, communication and presentation skills for effectively conveying information to the target audience, organization and management skills for planning and implementing long-term projects, research and inquiry skills for conducting research and presenting information clearly and concisely, self-assessment and reflection skills for identifying areas for improvement, and group participation and leadership skills for working collaboratively with peers. One member published an article on social media in education for the conference for students.

By aligning the desired outcomes skills with the content of the Instagram channel, the effectiveness of the project work can be assessed and areas for improvement identified. Instagram project work can help students develop the skills needed to create high-quality, engaging, and informative content about genetic disorders. Based on the data provided in Table 5, we perform inferential statistics to determine the level of association between the desired outcomes and the learners' attitudes by examining the mean scores for each question to see which desired outcomes were most strongly associated with the learners' perceived level of improvement.

Table 6. *Descriptive statistics for desired outcomes skills and Instagram project skills ratings*

Skills	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Mean	Min	Max	SD
Working in group	27.27%	36.36%	27.27%	9.09%	0.00%	49	3.18	1	5	0.98
Researching ideas	27.27%	63.64%	9.09%	0.00%	0.00%	49	3.82	3	5	0.6
Creating the product	63.64%	36.36%	0.00%	0.00%	0.00%	49	4.36	3	5	0.81
Designing the product	63.64%	36.36%	0.00%	0.00%	0.00%	49	4.36	3	5	0.81
Presenting ideas	36.36%	45.45%	18.18%	0.00%	0.00%	49	3.82	3	5	0.87
Exhibiting the product	36.36%	45.45%	18.18%	0.00%	0.00%	49	3.82	3	5	0.87
Learn New Skills	36.36%	54.55%	9.09%	0.00%	0.00%	49	4.09	3	5	0.7
Instagram was a great experience	54.55%	27.27%	9.09%	9.09%	0.00%	49	3.91	2	5	0.94

From Table 6, we can see that the mean scores for all questions are above 3.0, indicating that the learners generally had positive experiences with the Instagram project and perceived

improvement in the desired outcomes. The mean scores for «Creating the product» and «Designing the product» were the highest, at 4.36, followed closely by «Researching information» and «Learning new skills,» both with mean scores of 4.09. This suggests that the desired outcomes related to creating and designing content, as well as learning new skills, were strongly associated with the learners' perceived level of improvement.

To further explore the relationship between the questions, Pearson's correlation coefficient was calculated. Pearson's correlation coefficient measures the strength and direction of the linear relationship between two variables. In this case, the variables are the perception questions in Table 6, and the correlation coefficient shows how strongly they are related to each other. A correlation coefficient of 1.0 indicates a perfect positive correlation, while a coefficient of -1.0 indicates a perfect negative correlation. A coefficient of 0 indicates no correlation.

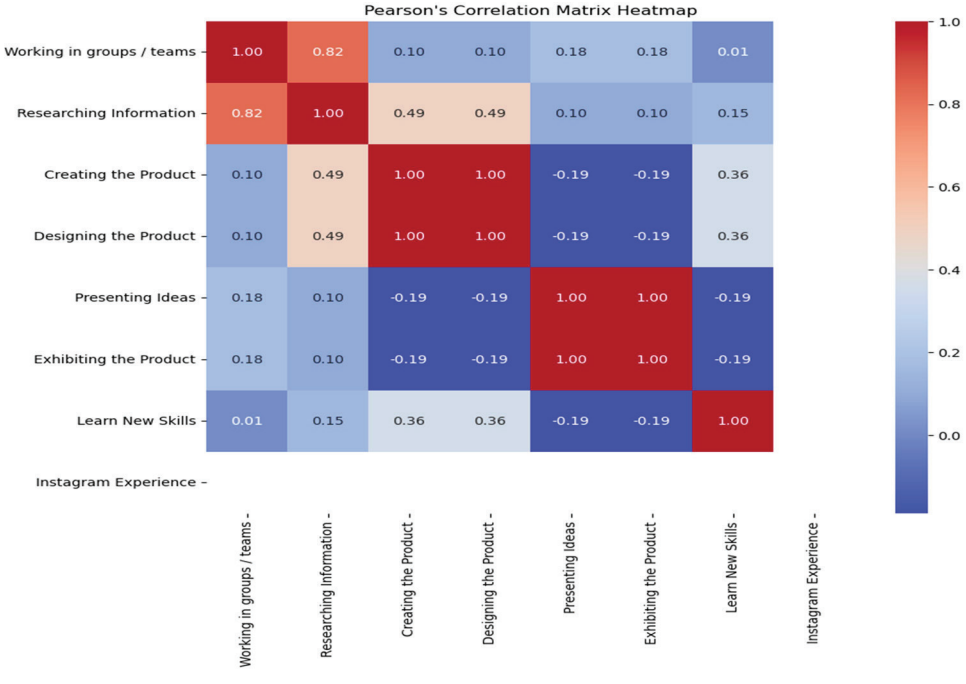

Figure 3: Pearson's correlation matrix heatmap for desired outcomes skills in Instagram-based learning

The correlation matrix heatmap illustrates the associations among various facets of project engagement. Each cell in the heatmap represents the correlation coefficient between distinct variables pertinent to project participation. Heatmaps employ a color gradient to depict the strength and direction of correlations between variables. Typically, cool colors such as blue are used to represent low values or negative correlations, while warm colors like red indicate high values or positive correlations. Shades of color intensity correspond to the magnitude of the values, with darker shades representing stronger correlations or larger values, and lighter shades indicating weaker correlations or smaller values. Neutral colors, such as white, are employed to denote values close to the midpoint or zero correlation. Looking at Figure 3, we can see that there are some moderate positive correlations between the different questions. For example, there is a moderate positive correlation between «Presenting Ideas» and «Exhibiting the Product» (r = 1.00) indicating that learners who are good at presenting ideas are also likely to be good at exhibiting their products and between "Creating the product", «Designing the Product» (r = 1.00) and suggesting that Instagram-based project engaged some learning experiences ("Creating the product", «Instagram was a great experience for me») (r = 1.00).

We believe that these findings have important implications for educators and instructional designers who are interested in promoting the development of these skills in learners. For example, instructional strategies that emphasize collaboration and delegation of tasks may be effective for promoting both group work and research skills. Similar to this, approaches that emphasize the growth of creativity and problem-solving skills may help foster both product creation and design capabilities.

Conclusion. According to the findings, social media can be a useful educational tool for helping students achieve their learning objectives. Students reported positive experiences with the Instagram project and perceived improvements in learning outcomes, with the greatest improvements in product creation, design, research, and learning new skills. Concept presentation, product display, learning new skills, and believing the Instagram project was worthwhile all had marginally positive correlations. This suggests that instructional strategies emphasizing collaboration, task delegation, creativity, and problem-solving may be useful for developing these skills.

While the study provides some insights into the relationships between the desired outcomes, there are some limitations to the interpretation of the results. For example, the study design did not account for other factors that may influence the development of the skills, such as learners' prior knowledge or motivation. Additionally, the study sample was relatively small, which may limit the generalizability of the findings. Overall, the results indicate the need for developing 21st-century skills in learners and the possibilities of other social media such as YouTube and Telegram, among others, as educational tools. By giving students autonomy to direct their learning on social media platforms they actively engage with, instructors can design motivating learning experiences that cultivate critical skills. Further research with a larger sample is needed to confirm and extend these findings.

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IRSTI 14.35.07 10.51889/2960-1649.2024.61.4.008

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STUDENTS' PERCEPTIONS OF ARTIFICIAL INTELLIGENCE USE IN HIGHER EDUCATION AND ITS IMPACT ON ACADEMIC INTEGRITY

Abstract

This study investigates student perceptions of artificial intelligence (AI) implementation and its implications for academic integrity within Kazakhstan's higher education system. Through a quantitative survey methodology, data was collected from 840 undergraduate students across three major Kazakhstani universities during May 2024. The research examined patterns of AI usage, ethical considerations, and attitudes toward academic integrity in the context of emerging AI technologies. The findings reveal widespread AI adoption among students, with 90% familiar with ChatGPT and 65% utilizing AI tools at least weekly for academic purposes. Primary applications include essay writing (35%), problem-solving (25%), and idea generation (18%). Notably, while 57% of respondents perceived no significant conflict between AI usage and academic integrity principles, 96% advocated for establishing clear institutional policies governing AI implementation. The study situates these findings within Kazakhstan's broader AI development strategy, particularly the AI Development Concept 2024-2029, while drawing comparisons with international regulatory frameworks from the United States, China, and the European Union. The research concludes that effective integration of AI in higher education requires balanced regulatory approaches that promote innovation while preserving academic integrity standards.

Keywords: artificial intelligence, higher education, students, academic integrity, ethical standards.

Introduction. In recent years, artificial intelligence (AI) has become the focus of attention not only in developed countries but also in developing economies, including Kazakhstan. The Republic, realizing the potential of this technology, has developed a multifaceted strategy for the development of AI, covering several key aspects. Kazakhstan's approach to AI is characterized by its complexity. The country strives not only to introduce technologies but also to create an ecosystem that promotes their development. An important element of the strategy is the harmonization of national standards with international norms in the field of AI. This allows Kazakhstan to actively participate in global initiatives aimed at regulating and developing artificial intelligence. It is noteworthy that special emphasis is placed on supporting innovative entrepreneurship. Startups and IT companies specializing in AI developments get access to the necessary resources, including computing power. This approach not only stimulates the development of domestic technologies but also attracts foreign investment in the sector. The implementation of this strategy is aimed at creating a favorable environment for innovation in the field of AI in Kazakhstan. It is expected that this will catalyze technological progress and economic growth, allowing the country to strengthen its position on the international stage in the era of digital transformation.

The recently adopted AI Development Concept for 2024-2029 represents an ambitious plan to integrate advanced technologies into key sectors of the country's economy. This document is not just a declaration of intent, but a detailed roadmap covering a wide range of initiatives. The Concept focuses on creating a robust infrastructure for AI. It is planned to install a powerful supercomputer and build modern data centers. These steps are critical for processing the large amounts of data needed for the development of AI technologies. In addition,

it is planned to create a national AI platform, which will become a key tool for researchers and developers. The emphasis on the development of human capital deserves special attention. The concept implies a significant expansion of educational programs in the field of AI and an increase in the number of specialized specialists. This is not only a response to the growing demand for AI experts, but also a strategic step towards the formation of a new generation of Kazakhstani innovators. An interesting aspect of the Concept is the KazLLM project - the creation of a large language model. This initiative goes beyond purely technological tasks, seeking to preserve and develop Kazakhstan's cultural and linguistic heritage in the digital age (Government of Kazakhstan, 2024). Plans for the introduction of AI cover a wide range of industries, from public administration to the oil and gas and mining sectors. Such an integrated approach is aimed at improving the efficiency and competitiveness of the economy. The importance of AI development is emphasized at the highest level. In his Message to the people of Kazakhstan, President Kassym-Jomart Tokayev outlined a course towards turning the country into a leader in the use of AI and digital technologies. A concrete step in this direction will be the opening of the National Artificial Intelligence Center in Astana in 2025. This center is designed as a universal platform for everyone - from schoolchildren to entrepreneurs, which should stimulate innovation and collaboration in the field of AI (Tokayev, 2022).

The rapid development of artificial intelligence (AI) has had a significant impact on various aspects of society, including education (Shen et al., 2023; Moya & Eaton 2024). In this article, we consider the actual problem of students' perception of the use of AI in academic activities. As intelligent systems are increasingly used in the educational process, scientific research, and publications, several ethical and moral issues arise that require careful study (Alwaqdani, 2024). Of particular concern are aspects related to academic integrity and originality of work when using AI. In this regard, the study of students' attitudes to this issue is extremely important for understanding the essence of the issue and developing effective solutions. The methodology of our research included surveying students. The main goal was to identify the opinions of students about how problematic they consider the use of AI in academic work in terms of honesty and originality.

The key issues of the study covered several aspects. First, we studied how students perceive the use of AI when writing essays or conducting research. Secondly, we were interested in the opinions of students about the impact of AI on the level of plagiarism and the quality of academic work. Finally, we sought to understand how deeply students are aware of the ethical and moral aspects of using AI and what, in their opinion, mechanisms should be in place to regulate these aspects in the academic environment. The conducted research represents an important step in understanding the ethical and moral issues related to the use of AI in education. Understanding the position of students and their perception of this issue can be the key to improving the practice of using AI in the academic environment. This will not only improve the effectiveness of the educational process but also ensure compliance with the principles of academic integrity and originality in the digital age.

The concept of academic integrity in the scientific literature is undergoing constant evolution, reflecting the changing realities of the educational environment. Various researchers and institutions offer their interpretations of this concept, which allows us to consider it from different angles.

East and Donnelly (2012) offer a concise definition, characterizing academic integrity as honesty in academic work and acceptance of responsibility. This approach focuses on two key aspects: directly on honesty in educational and scientific activities, as well as on conscious acceptance of responsibility for one's actions. Fishman (2014) expands this understanding by viewing academic integrity through the lens of fundamental values: honesty, trust, fairness, respect, responsibility, and courage. This allows us to perceive academic integrity not just as a set of rules, but as a holistic ethical system. An

institutional view of the problem is presented in the Australian Higher Education Standards 2021. Here, academic integrity is interpreted as a comprehensive principle for the entire academic community, based on five key values: honesty, mutual trust, fairness, respect, and responsibility. Calovic Nenezic et al., (2023) emphasize that the principle of academic integrity is based on honesty. Developing this idea, Amrane-Cooper et al. (2021) identify six fundamental values, adding courage to those mentioned above. The authors also note that academic dishonesty refers to practices that contradict these values.

The emergence of ChatGPT at the end of 2022 created several serious challenges for the education system (Brown et al., 2020), which echoes Turing's (1950) prediction about the competition of machines with humans in intellectual spheres. This is due not only to AI's ability to generate compelling texts, but also to fundamental questions about the nature of learning, assessment, and authorship in an academic environment. Given the scale of the problem, this study highlights the need to develop strict regulations to preserve academic integrity in the face of the growing influence of AI in education. It is important to note that AI tools should not be considered as a means of obtaining ready-made solutions but as an auxiliary resource for deepening understanding of the studied area.

To identify relevant publications on the topic, a targeted search was conducted in the Scopus database for the period 2014-2024 using the keywords «Academic Integrity» and «Higher Education». The analysis of the results shows a steady increase in the number of publications on this topic, which indicates the growing interest of the scientific community in the issues of academic integrity in the context of modern technological challenges.

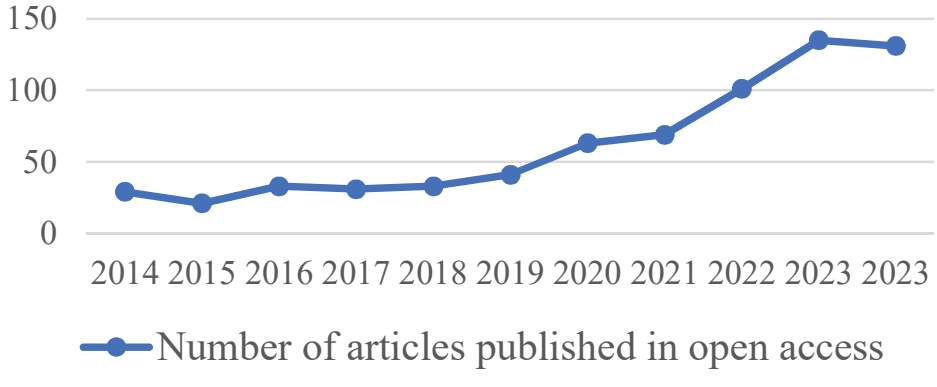

Figure 1: Number of open-access articles published on the topic of Academic integrity in higher education

An analysis of the publication activity in the field of academic integrity in recent years reveals interesting trends, especially in the context of global events and technological innovations. The COVID-19 pandemic, which caused a massive shift to distance learning, has made it much more difficult to monitor compliance with academic standards. This led to a noticeable increase in scientific interest in the issue of academic integrity: if 63-69 articles were published in 2020-2021, respectively, then in 2023 this number increased to 135 publications.

Such a sharp jump in publication activity in 2023 can be attributed to the appearance of ChatGPT at the end of 2022, which created new challenges for the educational system and science in general. This fact highlights the relevance of research on the impact of artificial intelligence (AI) on academic integrity in the modern educational landscape.

Recent research in this area presents a mixed picture. Lee et al., (2024), studying the impact of AI technologies on academic honesty among high school students, concluded that the introduction of tools such as ChatGPT did not

lead to a significant increase in cases of academic dishonesty. Interestingly, students tend to find using AI to generate ideas and explain concepts more acceptable than using it to complete entire tasks. Despite a slight increase in the use of unauthorized digital devices, most students still report not using such technologies. These observations highlight the need to prioritize improving AI literacy and developing nuanced policies in educational institutions. In turn, Johnston et al., (2024) focused on students in higher education institutions. Their research shows that generative AI is already widely used by students for both academic and personal purposes. The authors conclude that banning these technologies or switching exclusively to exam forms of assessment would be impractical and potentially harmful to the future career training of students. Instead, universities are encouraged to focus on developing skills to use these technologies productively and effectively. An interesting suggestion is to involve students in the joint development of guidelines for the use of AI. The study also highlights the need to create flexible policies that take into account various aspects of the use of AI, its potential benefits for different groups of students, and the importance of ensuring equal access to these tools.

Developing the topic of using AI in higher education, Zillmann et al., (2024) in their study revealed that a significant majority of students (79.5%) used AI systems for educational purposes, while their perception of the usefulness and ethical consequences of using these tools varies. Students who have used AI to complete the assessed tasks tend to treat them more favorably, however, there is a common understanding among all students of the reasons for using these tools, despite expressed skepticism about the reliability of the information provided by AI (Walan, 2024). These results point to the need for universities to develop clear guidelines and encourage open discussions about the ethical use of AI in the academic environment.

Waltzer et al., (2024) in their study identify another significant problem in higher education. College teachers, on average, score only 70% on the AI identification test, which indicates significant difficulties in distinguishing texts written by students and texts generated by AI. This finding, combined with the fact that AI itself has demonstrated higher confidence and a favorable attitude towards its educational use, highlights the complex implications of introducing these technologies into the academic environment. The discrepancy between the perception of humans and AI indicates an urgent need for educational institutions to develop new strategies for maintaining academic integrity and effective assessment. Liu et al., (2024) in their work focus on the need to develop effective methods for regulating the use of AI in the academic field. Their research demonstrates the high accuracy of some AI detectors in detecting texts created or paraphrased using artificial intelligence. For example, the tool Originality. ai showed impressive results, achieving 100% accuracy in detecting such texts. Another detector, ZeroGPT, demonstrated 96% accuracy with an AUROC score of 0,98.

It is interesting to note that human expertise has also shown high efficiency: the review professors were able to accurately identify at least 96% of the texts paraphrased by AI. However, they made a mistake in 12% of cases, classifying texts written by humans as created by AI. These results indicate the potential of using certain AI detectors to maintain academic integrity both in the work of students and in the publications of university staff. Another approach to solving the problem of academic integrity was proposed by Goddiksen et al., (2024); They have developed a gamified platform Integrity Games, which focuses on difficult ethical situations (gray areas) in the academic environment. The researchers conducted a large-scale randomized controlled trial involving 257 students from three European countries. The aim was to assess the impact of this tool on the motivation of students to study issues of academic integrity and their sensitivity to the problems of gray areas and violations.

The results of the study showed that students found Integrity Games an exciting tool and were ready to recommend it to teachers. The use of

the platform has indeed led to an improvement in the sensitivity of students to the problems of gray areas and violations of academic integrity. However, these improvements were not significantly higher than in the control group, which studied the same topics using traditional, non-gamified text materials. Although the approach has shown some effectiveness, the results have not been unambiguous, which underscores the need for further research in this area. Perhaps combining gamified approaches with traditional teaching methods can have a more pronounced effect. Thus, modern research offers a variety of approaches to solving the problems of academic integrity in the age of AI, from technological solutions for detecting non-author content to innovative educational methods. However, as practice shows, none of these solutions is universal, which underlines the need for an integrated approach to this problem.

The purpose of this study was to identify and analyze the perception of students of higher educational institutions of the use of AI in academic work, as well as to study their attitude to issues of academic integrity in the context of the use of AI technologies.

Materials and methods. As part of our research, a comprehensive questionnaire was developed that takes into account current trends in the study of academic integrity and the use of artificial intelligence (AI) in the educational environment. The questionnaire structure included both closed-ended questions for quantitative analysis and open-ended questions to gain a deeper understanding of students' opinions. Special attention was paid not only to the practical aspects of using AI but also to the ethical issues of its application in the academic environment.

The survey was conducted over three weeks in May 2024 using the Google Drive platform. The study involved 840 students of 1-4 bachelor's degree courses from three leading universities of the Republic of Kazakhstan: Al-Farabi Kazakh National University, Abai Kazakh National Pedagogical University, and Turan-Astana University. It is important to note that the sample included students from various faculties, which provided a variety of perspectives and opinions.

To preserve the objectivity of the research and protect the confidentiality of the participants, the survey results were presented in a generalized form, without highlighting data on individual universities. This approach to data collection and analysis allowed us to gain a comprehensive understanding of student's perceptions of the use of AI in the academic environment and their attitudes to issues of academic integrity in the context of new technological challenges.

Results. The distribution of participants by field of study showed a wide range of different specialties. The socio-humanitarian sector accounted for the largest share - 37% of respondents. The physics and mathematics field were represented by 33% of the participants, and the remaining 30% were in other specialties (Figure 2).

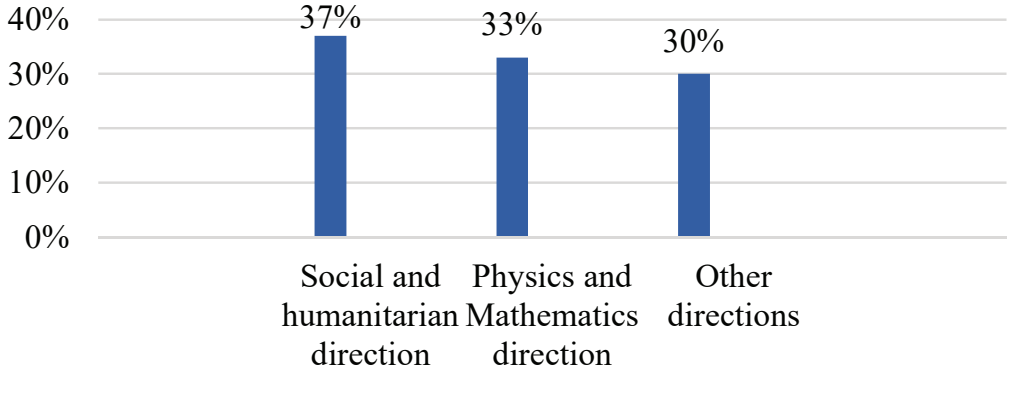

Figure 2: Indicators of the direction that took part in the survey

This diversity allows us to consider the opinions of students with different academic backgrounds. It is important to note that the study covered students from different courses, which ensured that the sample was representative in terms of educational level (Figure 3). This makes it possible to analyze how attitudes towards AI and academic integrity change at different stages of learning.

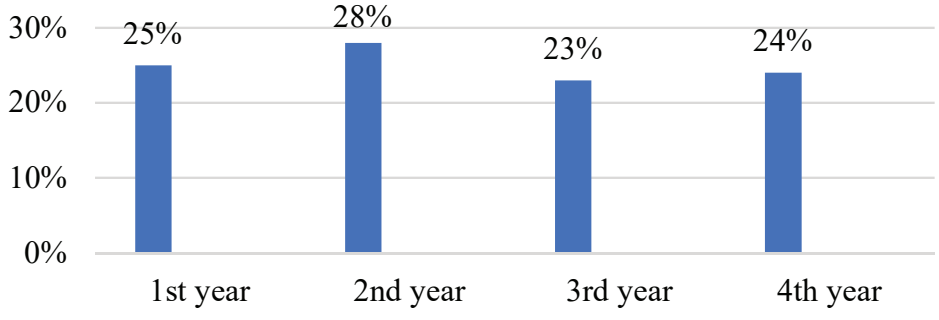

Figure 3: Indicators of years of study who took part in the survey

Of particular interest are the results of the question about the familiarity of students with various AI tools. The vast majority of respondents (90%) indicated that they know about ChatGPT, which is not surprising, given its popularity recently. Other tools turned out to be less well-known: DALL-E was chosen by 2% of respondents, Midjourney - 1%, and Copilot - 3%. Another 4% of respondents indicated other AI tools (Figure 4).

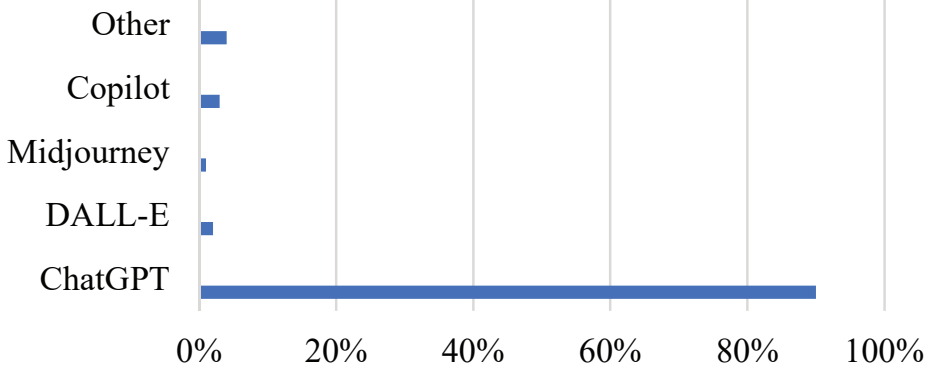

Figure 4: The results of respondents to the question «Which AI tools do you know from the suggested options?»

The study of the frequency of using artificial intelligence (AI) tools by students for educational purposes has revealed interesting trends in the modern academic environment. The survey results show that AI has already become an integral part of the educational process for a significant part of students.

An analysis of the answers to the question How often do you use AI tools for educational purposes? Gave the following distribution: Never - 0%; Rarely (1-2 times a semester) - 10%; Sometimes (1-2 times a month) - 25%; Often (1-2 times a week) - 30%; Very often (almost every day) - 35%. It is noteworthy that none of the surveyed students indicated that they never use AI for educational purposes. This indicates that AI technologies have already firmly entered the arsenal of tools used in the learning process.

The largest proportion of respondents (35%) noted that they use AI almost daily,

which indicates a high degree of integration of these technologies into everyday educational activities. Another 30% of students use AI tools 1-2 times a week, which also indicates regular use. A quarter of the respondents (25%) turn to AI 1-2 times a month, which may indicate a more selective approach to its use, perhaps for solving specific tasks or in certain educational situations. Only 10% of respondents noted that they rarely use AI, 1-2 times a semester. This may be due to various factors, such as the specifics of the disciplines being studied, personal preferences, or lack of awareness of the possibilities of AI in an educational context.

The results obtained allow us to conclude that AI has become an important tool in the academic life of modern students. However, it is worth noting that its use is not widespread and evenly distributed (Figure 5).

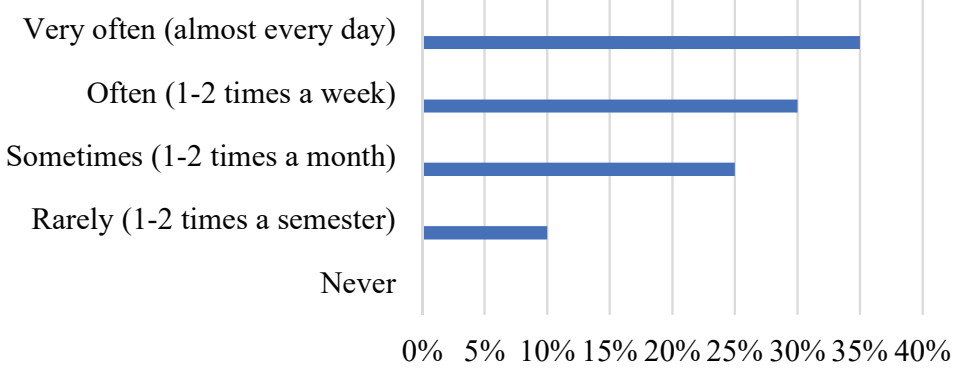

Figure 5: Respondents' answers to the question «How often do you use AI tools for educational purposes?»

The present study also raised the issue of specific learning tasks for which students use artificial intelligence (AI) tools. The survey results on this aspect turned out to be very revealing and highlighted several interesting trends.

Of particular interest are the results of the question of the perception of the use of AI in the context of academic integrity. To the question "Do you think that the use of AI for educational purposes contradicts the principles of academic integrity?" The answers were distributed as follows: Yes, completely contradicts – 10%; «Rather contradicts – 18%; Neutral – 15%; Rather not contradicts – 40%; No, doesn't contradict at all – 17% (Figure 5). These data, presented in Figure 5, show that the majority of students (57%) do not see a significant contradiction between the use of AI and the principles of academic integrity. This may indicate the formation of a new understanding of academic ethics in the digital age.

However, a significant proportion of respondents (28%) still believe that the use of AI to some extent contradicts the principles of academic integrity. This indicates the need for further discussion and the development of clear recommendations on the ethical use of AI in the educational process.

The analysis of the results of the present study revealed several significant trends in the use of artificial intelligence (AI) by students of higher educational institutions:

1. The dominant field of AI application turned out to be writing academic papers, which was noted by 22% of respondents. This may be due to the ability of modern AI systems to quickly generate structured texts that meet academic standards. This trend raises certain concerns from the point of view of academic integrity and requires further study.

2. 10% of respondents indicated the use of AI to solve problems. This indicates that it is also in demand as a tool for analyzing complex problems and finding optimal solutions. This aspect can have both a positive impact on the development of analytical skills of students,

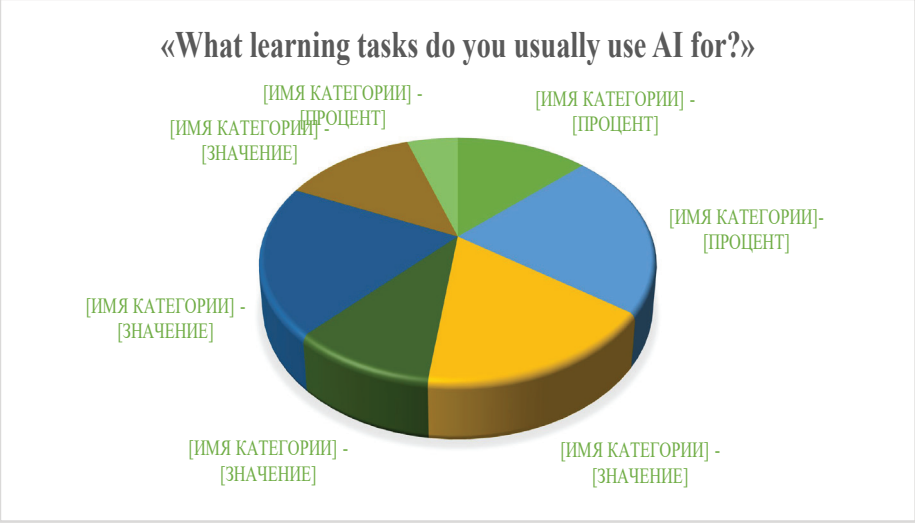

Figure 6: Respondents' answers to the questions «What learning tasks do you usually use AI for?»

as well as potential risks in the context of the independence of completing tasks.

3. The generation of ideas using AI (13% of respondents) indicates the perception of artificial intelligence as a catalyst for creative thinking. This can be considered as a positive trend contributing to the development of an innovative approach to solving academic problems.

4. It is interesting to note that only a small proportion of students (13%) use AI to prepare for exams. This may be due to the limited availability of specialized AI tools for exam preparation or to the methodological features of the exam preparation process itself.

5. 10% of respondents (2%) noted the use of AI for communication in the «question-answer» format. This may indicate the potential of AI in the field of problem-solving.

6. A small percentage of respondents (5%) noted the use of AI for personalized learning, for instance, getting additional explanations on challenging topics.

7. About 20% of respondents use the capabilities of artificial intelligence to study and improve their level of foreign language.

Regarding the compliance of the use of AI with the principles of academic integrity, the respondents' opinions were distributed as follows: "Completely contradicts" - 10%; Rather contradicts - 18%; Neutral - 15%; Rather does not contradict - 40%; Doesn't contradict at all - 17%.

Respondents also expressed their opinion on the following statements (on a scale from 1 to 5): a) Using AI to complete tasks is a form of deception: I completely disagree - 52%; I completely agree - 48% b) AI is another learning tool: Disagree - 15%; agree - 85% c) Using AI improves the quality of my work: Disagree - 35%; agree - 65%.

The analysis of respondents' answers to questions about the use of artificial intelligence (AI) in the educational process revealed several interesting trends and contradictions in the perception of this technology by students.

Most respondents (58%) are in favor of unlimited use of AI for educational purposes. This may indicate a high level of acceptance of the technology and its perceived usefulness. However, a quarter of respondents (25%) believe that the use of AI should be subject to some restrictions, which indicates awareness of potential risks. It is noteworthy that 15% advocate a complete ban on AI in the educational process, demonstrating a more conservative approach.

An interesting paradox is observed regarding the indication of the use of AI in the works. Although the majority support

the use of AI, only 15% indicate its constant use, and 20% - sometimes. The vast majority (65%) never indicate the fact of using AI. This discrepancy between support for technology and unwillingness to advertise its use deserves further study.

Opinions on the impact of AI on the quality of learning are divided. While 40% believe that AI improves the quality of learning (25% - significantly, 15% - slightly), 40% hold the opposite opinion (25% - slightly worsens, 15% - significantly worsens). This division of opinion indicates the need for further research on the real impact of AI on educational outcomes.

The almost unanimous opinion (96% of respondents) on the need for universities to develop a clear policy on the use of AI indicates the need for institutional regulation of this issue. This may be due to the uncertainty and ethical dilemmas that students face when using AI.

Regarding specific regulatory measures, the majority (55%) support the idea of allowing the use of AI with mandatory indication of this fact. This proposal can serve as a compromise between the free use of technology and the observance of academic ethics. Also, a significant part of the respondents is in favor of educational initiatives: 20% for training in the ethical use of AI, and 15% for integrating AI work into the curriculum.

The analysis of the answers to the open-ended questions of our study provided valuable insights into the perception and use of artificial intelligence (AI) by students in the academic environment.

When asked about specific situations where AI is used for educational purposes, many respondents noted its impact on grades rather than on the quality of learning. A typical response was: «I do not know how it affected the quality, but it had an impact on the score received for the work. There was a case when I used AI when writing an essay, I did not indicate that it was the work of AI, and at the same time I got a high score». Such answers point to a potential problem: students may perceive AI as a tool for getting high grades, rather than as a means of improving the quality of learning.

Regarding the possibilities of using AI while maintaining academic integrity, the respondents offered several interesting ideas:

1. Personalized learning: AI can create customized educational programs that take into account the level of knowledge and learning pace of each student.

2. Objective evaluation and feedback: Using AI to evaluate work can reduce bias and minimize errors. At the same time, the importance of transparency in the assessment process is emphasized.

3. Individual recommendations: AI can offer additional materials and tasks based on the individual needs of the students.

4. Plagiarism detection: AI systems can effectively detect cases of plagiarism, contributing to the maintenance of academic integrity.

5. Creating virtual educational environments: And can be used to develop interactive simulations and simulators.

6. Teacher support: And can help with curriculum development, assignment creation, and analysis of academic performance data.

These proposals demonstrate that students see the potential not only as a tool for completing tasks but also to improve the educational process. However, the discrepancy between these idealistic ideas and the actual practice of using AI, which is reported by students, indicates the need for further work on integrating AI into the educational process ethically and effectively.

Discussion. Analyzing the data obtained, the authors concluded that there is a need for a balanced approach to the use of artificial intelligence in the educational field. Despite the obvious advantages that AI provides, its application must be carried out in strict accordance with ethical standards and legislative frameworks. At the same time, the introduction of AI technologies mustn't lead to a violation of academic integrity, which remains a fundamental value of the educational process.

In this context, the experience of the leading world powers is indicative. The USA, China, and the countries of the European Union have

already taken steps to establish legal regulation of AI technologies. In the USA, this was reflected in the National Artificial Intelligence Initiative, in China the New Generation of Artificial Intelligence Development Plan was adopted, and in the European Union, the Artificial Intelligence Act is being developed. These initiatives demonstrate the awareness at the state level of the need to create a legal framework for the development and application of AI technologies.

Considering global trends and the results of the conducted research, the authors conclude that it is necessary to develop a similar legal regulation in Kazakhstan. The creation of a regulatory framework for the use of AI in education is particularly relevant. Such regulation should be aimed at ensuring the ethical and effective use of AI technologies in the educational process while maintaining high standards of academic integrity and quality of education.

The development of an appropriate regulatory framework will not only establish clear rules for the use of AI in the educational environment but also create a basis for the development of innovative approaches to learning. This may include recommendations for integrating AI into curricula, standards for the development and application of AI tools in education, as well as mechanisms for monitoring compliance with ethical standards when using AI.

Thus, the legal regulation of the use of AI in the educational sphere of Kazakhstan seems not only timely but also a necessary step to ensure the competitiveness of the national education system in the context of global digitalization.

Conclusion. This comprehensive investigation into artificial intelligence implementation in Kazakhstan's higher education system yields several significant findings and implications for academic policy development. The study reveals widespread adoption of AI technologies among undergraduate students, with 65% utilizing AI tools weekly or more frequently. The primary applications center on academic writing (35%), problem-solving (25%), and ideation (18%), indicating AI's substantial integration into academic workflows. Notably, there exists a significant dichotomy in perceptions of AI's relationship to academic integrity, with 57% seeing no significant conflict while 28% express ethical concerns. An overwhelming majority (96%) advocate for clear institutional policies governing AI usage, highlighting the urgent need for structured institutional responses. As Kazakhstan continues to develop its AI infrastructure through initiatives like the AI Development Concept 2024-2029, educational institutions must balance technological innovation with academic integrity preservation. The study suggests three primary areas for development: comprehensive policy frameworks including institutional guidelines and protocols for AI usage; educational practices involving training programs and assessment methods; and regulatory alignment with international best practices while maintaining context-specific approaches for Kazakhstan's educational environment.

Further research is recommended to examine long-term impacts of AI integration on learning outcomes, investigate faculty perspectives and preparedness, develop and evaluate effectiveness of AI-specific academic integrity policies, and study cross-cultural variations in AI implementation approaches. This research contributes to the emerging discourse on AI in higher education while providing practical insights for policy development in Kazakhstan's educational institutions. The findings underscore the importance of developing nuanced, context-appropriate responses to technological integration while maintaining academic standards and ethical principles. The conclusions drawn from this study may serve as a foundation for future policy development and research initiatives in Kazakhstan and similar educational contexts, particularly within the Central Asian region. As AI technology continues to evolve, maintaining this balance between innovation and integrity will remain crucial for the future of higher education.

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Publishing editor: *Talgat Kilybayev*
Layout: *Sharban Aitmukusheva*
Design: *Akerke Yskak*

Printed at the publishing house “Ulagat”
Abai Kazakh National Pedagogical University

Signed for printing: December, 2024
Format 60x84$^{1}/_{8}$. Syktyvkar paper.
Printed sheets 20,0. Order no 157.

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