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WORK-INTEGRATED LEARNING: ANALYZING PARTICIPANT INTERACTION AND DEVELOPING PROFESSIONAL SKILLS OF STUDENTS

Abstract: Work-integrated learning is considered to be an effective tool to help student develop the necessary skills to function in a work environment. Work-integrated learning combines university training and on-the-job training in industry organizations. Work-integrated learning allows students to have real working methods and professional qualities in the context of the work environment even before completing academic studies. This enables students to build confidence in their abilities, improve understanding of the work process, the nature of the skills required in the profession being mastered, as well as the development of employability skills. This is recognized as an important factor in the effective professional activity of university graduates in the workplace. The growing interest in work-integrated learning requires research and clarification of the processes of joint interaction of participants.

The article examines the process of joint interaction of the participants of work-integrated learning. For this purpose, a survey was carried out of direct participants in the process of work-integrated learning at the university - stakeholders (students, academic and industry representatives). The survey allowed to collect primary data on the experience of work-integrated learning and improved the understanding of the process of integration of academic and industry cooperation.

The survey of students was aimed at revealing their experience of on-the-job training. They were also presented with a list of skills that they were able to learn or improve as part of on-the-job training.

Questions for academic and industry representatives covered the following topics: the role of the preparatory phase in the transition from academic learning to on-the-job learning; teaching methods and ways to get feedback; integration of on-the-job learning experience into further university education; Improvement of the work-integrated learning system.

Keywords: work-integrated learning, university, student, industry organizations, stakeholders

Introduction. Work-integrated learning has long been used in the strategy of university teaching, sometimes strengthening, sometimes weakening. Currently, there is an increase in the use of work-integrated learning in higher education. This growth is due to the fact that work-integrated learning programs give an advantage to students, employers and universities, i.e. stakeholders in this process.

Work-integrated learning promotes the establishment of partnerships between universities and industry organizations, which is necessary for the development of joint educational programs that meet the needs of the industry (Smith et al., 2010).

The involvement of employers in training has become the norm, since the main goal of higher education is to provide students with the skills necessary for employers, graduates must come to work ready to perform their professional duties in order to better withstand the increased competition in the labor market. Employers are looking for graduates with a range of skills (Hard and Soft skills) in order to minimize additional training in a new workplace (Patrick et al., 2008).

The work experience gained by students in work-integrated learning studies strengthens the academic learning gained at the university and ensures the development of the skills necessary for graduates. Studies indicate that it is problematic for universities to form soft skills in students, since compared to ordinary students, those who have completed work-integrated learning more easily, find a job, integrate in a new place of work and develop their careers faster (Coll&Zegwaard, 2006).

Atkinson et al. (2005) emphasize that work-integrated learning provides broader learning outcomes and allows students to gain advantages in the development of educational, personal, career, and professional skills.

Work-integrated learning has a positive effect on academic performance, as it increases the motivation and responsibility of students (Gamble et al., 2010).

In this way, it deepens the need for work-integrated learning. At the moment, however, it is more pragmatic and operational for all stakeholders, research on work-integrated learning mainly focuses on skill development and with less focus on the process of how students learn. In most cases, the work-integrated learning is carried out informally, but consciously through experience. Recent research is improving understanding of the interaction between academic and practical training experience in the design, structure and management of work-integrated learning (Smith, 2012). The researchers aim to develop a theoretical framework for work-integrated learning. The university environment is different from the work environment, but at the same time, learning is recognized in each of them, although it is different, but also complements each other.

The idea of work-integrated learning is based on the theory of active learning, in which students move from visualization and listening to actually doing what they have been taught, and situational learning, in which learning is enhanced by participating in a community of practice rather than in isolation from it (Billett, 2011). Students should be able to interact with real-world work environments and perform practical tasks as part of their university experience. This requires careful consideration of many factors when implementing work-integrated learning:

- host organizations should provide access to industry supervisors, set and formulate their expectations of students, and facilitate learning through induction processes. Industry supervisors should provide feedback to students to facilitate their professional development. Despite the importance of getting feedback, the literature pays little attention to how to get and document feedback from industry supervisor (Ha, 2021);

- university should develop work-integrated learning programmes that include learning activities that are appropriate to the learning outcomes and their effective evaluation. It is important to integrate academic learning with on-the-job learning so that students establish the relationship between these types of learning, critically evaluate learning concepts, and practice specific professional behaviors to effectively develop skills and knowledge. In order to integrate learning, it is necessary to create conditions in the university and in the workplace, often it is simply expected. The researchers highlight common principles for this, which include pre-apprenticeship training, support during apprenticeships, and opportunities for reflection to connect the two experiences of academic and on-the-job training (Jackson & Dean, 2022);

- reflection is important for the integration of learning and should be done before and after on-the-job training. Journals, portfolios, study circles can be a tool for this, which will contribute to a critical analysis of the actions performed and to the identification of strengths, weaknesses and future training needs. It also allows students to put theory into practice and their skills in a variety of practical tasks. As a result of the reflection on the expectations of the students, the acquired skills are clearly defined and taken into account. This helps to effectively assess the success of work-integrated learning (Khampirat et al., 2019);

- work-integrated learning experiences highlight the importance of supervisor for the successful transfer of skills from university to the workplace. Varghese et al. (2012) propose a mentoring model that contains four criteria: content – the types of knowledge needed to solve professional tasks in the workplace; methods – ways of teaching skills and knowledge in the context of work-integrated learning; sequencing – the way in which knowledge and skills are formed so that learning has structure and meaning; An environment is a learning environment that will allow students to integrate theory into practice (Varghese et al., 2012).

As one of the aspects of effective work-integrated learning practice, research emphasizes the integration of academic and sectoral collaborations, their interaction is crucial to ensure the assessment of learning outcomes. The challenge is how to redirect assessment from the academic setting to the industry context, focusing on genuine collaboration between industry supervisors, academic supervisors, and students. This will allow students to receive feedback from the industry, taking into account the jointly agreed learning outcomes.

Methods and organization of the study

The purpose of the study was to collect data from interviews and surveys of academic supervisors, industry supervisors and students to understand the process of their joint interaction in the process of work-integrated learning. The basis of the study was NJSC "Toraigyrov University".

The survey made it possible to collect primary data on the experience of work-integrated learning and improved the understanding of the process of integration of academic and industry cooperation, since information was collected from direct participants in the process of work-integrated learning at the university - stakeholders.

As a tool, questionnaires were used, which included questions to record the fact and an interview that revealed the opinion of stakeholders.

The interview data was analysed using a thematic analysis that allowed the data to be collected and organized into patterns that give meaning and answer the research questions.

The data obtained will be used to increase the efficiency of the work-integrated learning process, which will allow for better mastering of the content of a specific professional activity.

Results and discussion

Questions for academic and industry representatives were divided into topics, which are presented below.

The role of the preparatory stage in the transition from academic training to on-the-job training.

Academic and industry supervisor surveyed noted the need for collaborative participation in the planning of students' on-the-job training. In doing so, they highlighted the difference between academic learning and on-the-job training, as well as their relationship. The process of transition of the student from one environment to another is important here. On-the-job training is practice-oriented, the learner applies the acquired knowledge and skills in practice in a real professional situation. In the working environment, theoretical knowledge is integrated with professional skills through inclusion in professional activities. Respondents noted that on-the-job training requires students to be more self-reliant, as the work environment is more self-sufficient and does not require much support from a supervisor, as opposed to an academic environment. Support and collaboration between supervisors before students enter the work environment is important here. Students are required to participate in preparatory activities before joining the organization. Industry supervisors noted that the preparatory phase should include explanations of the role of students in the workplace, an understanding of what employers expect from them as employees of the organization, how they can apply theory in practice. The supervisors from the university emphasized the importance of the academic

component of the preparatory stage. In particular, when developing a working curriculum, a syllabus, the learning outcomes, the tasks that students must perform during the training at the workplace should be described. These should be agreed upon with industry supervisor and academic supervisor.

It can be concluded that industry supervisors in work-integrated learning see more of the students as a recipient of work experience, academic supervisors see work-integrated learning as a continuation of on-the-job learning. It was also not specified when the preparatory stage should begin and how long it should take.

Teaching methods and ways to get feedback.

In the implementation of academic and on-the-job training, the teaching methods used are important. Industry supervisors noted that they mainly encourage students to be independent, so that they would realize what it is like outside the university, what is required of them at a real place of work. They advise them on the best way, as the necessary knowledge is not explicit, treat students as colleagues, and this gives them support in developing their professional identity. Industry supervisors noted the importance of the feedback they give to students. They discuss with students the strengths and weaknesses of their work and determine further actions. Industry supervisors have not been able to directly identify the methods they use in training, as they mostly act on a hunch in the circumstances that arise. Learning occurs as a result of performing professional activities under the supervision. This is different from what teachers use at the university.

The academic supervisors indicated that the theory obtained at the university should be confirmed in practice. When teaching at the university, they try to use more practice-oriented methods: cases, problem-based learning, situational method, and others. By applying these methods, they try to encourage students to reflect. Students should plan their actions before committing to them, this gives them the opportunity to take responsibility for their own actions, which will be further expressed in the development of their independence not only in the performance of professional tasks, but also in the planning of their training. Students will see their gaps in knowledge and skills that they lack in their professional activities.

It can be concluded that academic supervisors need to work more closely with industry supervisors on the application of teaching methods. Students learn a lot in the workplace, but this learning is more random, depending on what professional situations they find themselves in. It is necessary to jointly develop and structure teaching methods. This will facilitate the transition of students from the academic environment to the working environment and make work-integrated learning more formal.

Integration of on-the-job learning experience into further university education.

It is expected that after returning from an industry organization, students should transfer the experience gained to an academic environment and apply it in the classroom. Academic supervisors believe that students can apply the practical skills they have acquired in the workplace when performing laboratory work, writing projects, term papers and graduation theses. They noted that the students are more aware of modern methods of work, they have more developed soft skills. However, the application of the practical experience gained is not mandatory and depends mainly on the initiative of the students themselves.

Improvement of the work-integrated learning system.

Respondents were asked to give recommendations on how to improve the work-integrated learning system: among the answers are the following:

- organization of internships for university professors to obtain more up-to-date information about the industry and requirements for professional competencies;
- improving feedback between industry supervisors and academic supervisors;
- professional development of industry supervisors in the field of pedagogy;
- clearer definition of the roles of academic supervisors and industry supervisors.

The survey of students was aimed at uncovering their experience of on-the-job learning.

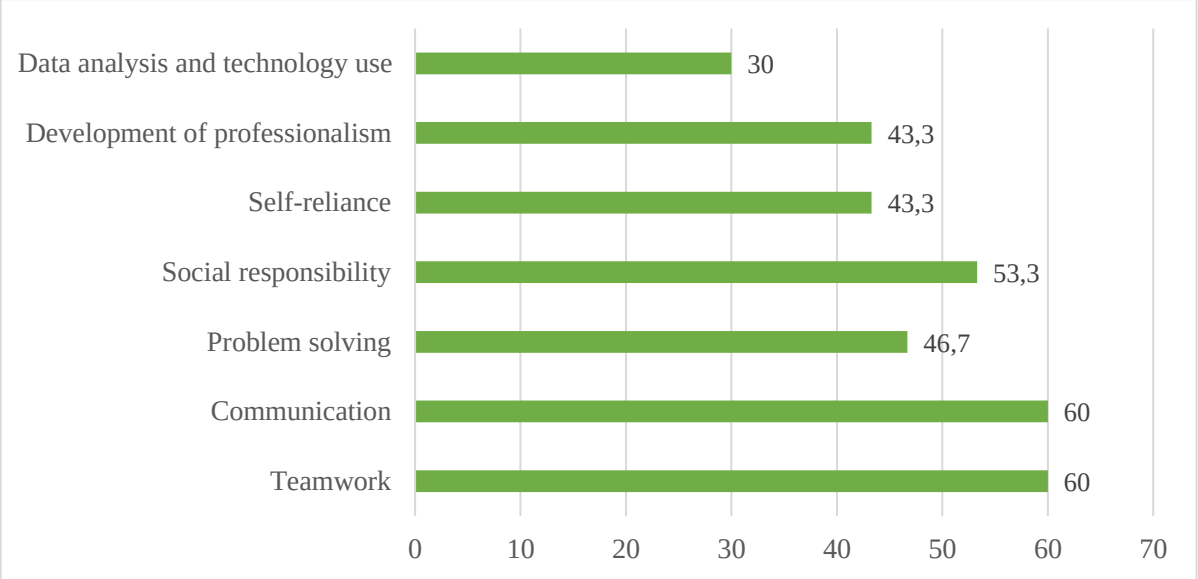
Students were presented with a list of skills that they were able to learn or improve as part of on-the-job training. Skills were grouped into the following categories:

- teamwork: collaborative work on professional tasks; conflict resolution;
- communication: verbal communication; giving and receiving feedback; public speaking;
- problem solving: reasoning analysis and diagnostics of the problem situation that has arisen; decide;
- social responsibility: personal and professional ethics; organizational awareness;
- self-reliance: self-efficacy; stress; work/life balance; self-regulation;
- development of professionalism: efficiency; multitasking; time management;
- data analysis and technology use: technology; information management.

The data of the students' answers are presented in Figure 1.

Figure 1

Diagram of students' responses to On-the-Job Skills, %



As the diagram shows, on-the-job training contributed to the development of skills in the categories "Teamwork" and "Communication" (60%), and "Social Responsibility" (53.3%). Student noted that these skills are better developed during on-the-job training due to the possibility of direct interaction with specialists, which allowed for a better understanding of ethical and professional behavior, what happens directly in the workplace.

Practical work experience served to improve such skills as "Problem solving" – 46.7%, "Self-reliance " – 43.3%, "Development of professionalism" – 43.3%. The students noted that due to the performance of professional tasks, they developed self-confidence and a sense of responsibility.

Being in the working environment, the students were able to understand how their actions affect the solution of real professional problems, they began to think more critically, engage in reflection, and saw what technologies are used in their field of work.

Students noted the advantages of integrating education at the university and in the workplace. They outlined the importance of developing the acquired skills at the university in the workplace, which will allow them to be applied before starting direct work after receiving a diploma. Being in a working environment allowed them to become more aware of their role

and responsibilities in the organization, and the industry's expectations of them as future specialists.

The students pointed out that the application of the acquired skills in the workplace was facilitated by training at the university, the classes themselves, which contained elements of practice-oriented teaching methods, group work, and the preparation of a presentation. It gave them an idea of situations or problems they might face in the workplace, developed teamwork skills, experience in public speaking.

Of the difficulties faced by students in on-the-job training, they noted the lack of experience with new technologies and the need to master them quickly and effectively in the workplace. There was also a downside, some students noted the lack of new technologies and methods of work in the workplace. Students also felt a lack of support in the workplace due to the fact that they were treated more like students than colleagues and professionals. This limited them and prevented them from expressing their opinions, showing initiative and greater independence.

Findings

A review of the results of the study shows the importance of work-integrated learning not as an alternative to traditional learning, but as a complement to it. work-integrated learning should be integrative in nature, i.e., how the learner uses what he or she has learned in the workplace and vice versa, how what students learn in the workplace becomes incorporated into the next phase of academic learning when they return to university after completing on-the-job training (Doolan et al., 2019).

On-the-job training should be based on the knowledge and skills acquired at the university. This requires close collaboration between academic supervisors and industry supervisors, which must take place before students are placed in the workplace, during on-the-job training and afterward, when they return to the university to continue their academic studies.

The preparatory stage is before the placement of students at the workplace.

The stage of preparing students for work-integrated learning should begin before they enter the working environment and include the development of documentation that clearly spells out the roles of students in the workplace, the tasks they are expected to perform during the training period and the learning outcomes they must achieve upon completion. The roles of academic and industry supervisors should also be clearly defined. Academic supervisor, industry supervisor and students need to plan together for the future professional activities of students in the workplace.

Training should be carried out during classroom training. Teachers, in consultation with industry supervisors, should introduce elements of upcoming professional activities into the lesson, while using practice-oriented teaching methods (Grantham, & Iachizzi, 2024).

On-the-job training phase.

At this stage, feedback is important to ensure the professional development of students. Feedback allows students to evaluate the applied professional knowledge and skills to the assigned tasks. Feedback from the industry supervisor will allow academic supervisors to track the learning process in the workplace and provide an opportunity to adjust the actions of students and the industry supervisor. During on-the-job training, the teaching methods used are important because they differ from what teachers use in a university.

The stage of continuing academic studies.

At this stage, the trainee, after completing on-the-job training, applies the acquired knowledge in the classroom. To do this, it is necessary to prescribe special tasks in the syllabuses.

At each of these stages, the interaction of all stakeholders in the process is important: students, academic supervisors and industry supervisors.

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Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

Ethical Statement

The empirical research conducted in this study was reviewed and approved by the Institutional Review Board, ensuring compliance with all relevant ethical guidelines for research involving human subjects

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PEDAGOGICAL CONDITIONS FOR THE FORMATION OF GEOGRAPHY TEACHERS GEOECOLOGICAL COMPETENCE IN THE EDUCATIONAL PROCESS

Abstract: Today, the formation of competence of geography teachers is an actual task of higher education. To prepare a competitive personality capable of perceiving global problems, to functioning in new socio-economic, socio-cultural conditions, taking into account the modern concept of the joint existence of man and nature. Competence is the ability and knowledge in the field of interaction between geosystems and ecosystems, the influence of human activity on the surrounding nature, as well as the ability to adapt to changing environmental conditions and effectively respond to environmental threats and challenges.

The article has an analysis of theoretical and methodological literature, the following concepts are specified and given to the following concepts: “competence”, “competency-based approach”. The pedagogical conditions for the effective formation of the competence of geography teachers in the educational process have been identified and substantiated, and the pedagogical technology for the formation of geography teachers’ competence in the educational process of the university (through the disciplines of the professional cycle, educational and scientific research activity) has been identified.

Key words: competence, competence-based learning approach, geoecological skills, didactics, pedagogical condition.

Introduction

In the context of the education reform being carried out in the Republic of Kazakhstan, the professional training of future teachers, who will have to work in the conditions of a new educational paradigm and ensure the quality of education that meets modern requirements, is of particular importance today.

A new education system is being formed, which is focused on modern trends in the world educational space. This process entails significant changes in pedagogical science and the content of the educational process. These conditions oblige the modern teacher to be competent in a wide range of modern innovative approaches to modeling new generation educational materials (PRK, 2019). Currently, the global level of training is confirmed by the effectiveness of learning, since it contributes to the student’s knowledge, business skills, independent research, strengthening motivation for the study and development of personal qualities (Kudaibergenova, 2013).

And today, more than ever, the question of culture as an integral part of the general human culture is relevant. The main role in the formation of consciousness is behind education.

The system of pedagogical education is faced with the task of preparing a competitive individual who is capable of perceiving global problems, of functioning in new socio-economic, socio-cultural conditions, taking into account the modern idea of the coexistence of man and nature, which leads beyond the limits of narrow professional subject competence, generates the need for the formation of a new professional competence of a specialist in the field of education - geoecological competence (Bakirova&Seilkhan, 2014). In this context, it becomes necessary to single out competence as a component of professional competence.

Despite the existence of research on environmental education, there is a lack of systematic approaches to the formation of geoecological competence specifically for geography teachers. The problem is the lack of methodological models that would include the combination of geographical and environmental knowledge in teaching practice. Based on the above, the formulation of the problem of this study is to determine the pedagogical conditions that promote the formation of geo-ecological competence in the educational process. Taking into account the stated problem, the aim of the study was formulated - to determine the optimal pedagogical conditions for the formation of competence of geography teachers in the teaching process. The objectives of the study are: to reveal the theoretical foundations of the competence approach in the preparation of teachers of geography; to specify the essence of competence; to determine the pedagogical conditions of effective formation of competence of teachers of geography in the educational process.

The object of the research is the process of formation of geography teachers' competence on the basis of a higher educational institution. Subject of research: pedagogical conditions for the formation of geography teachers' competence.

Research methods and organization

In the process of research, a method of systematic literary analysis of theoretical and practical material, as well as content analysis of publications on the Internet and other media was used.

The method of pedagogical experiment was also applied. Experimental work was organized on the basis of Zhetysu University named after I. Zhansugurov in Taldykkorgan city on the educational program "Geography".

The work was organized in several stages:

- analyzed the profile disciplines of the modular educational program Geography;
- identified sections and themes of the relevant disciplines for the development of the competence of students;
- a thematic separation of the content of didactic material was carried out in accordance with the type of competencies formed;
- changes in their content were made within permissible limits;
- interdisciplinary relations were determined;
- methodological developments of special classes with a orientation were carried out;
- text tasks and methods for assessing the degree of effectiveness of the educational process were prepared.

In the process of research, the main levels of the formation of the geoecological competence of students were determined: very low, low, average, high. Formation indicators are: cognitive, motivational-value, active-practical components. The experiment was conducted in two stages: stating and forming. The study involved 58 students of 3-4 courses of the educational programme 'Geography', where 28 students constituted the control group and 30 students were included in the experimental group. Each group included participants with low and high level of knowledge according to the results of pre-testing to ensure uniformity and objectivity of the results.

The scale of the formation of geoecological competence were applied as pre-test and post-test in order to examine the changes in students' geoecological skills. The pre-test and post-test were conducted on stating and forming stages. Instruments for indicators of identifying the level of geoecological competencies are Understanding the Problem, Describing the Problem, Planning the Solution, Using the Solution, Evaluate the Solution. Test consists of 40 multiple-choice questions. For each question answered correctly 1 point and for each question answered incorrectly 0 point were given. The maximum score for the test is 40 and the minimum score is 0.

As part of the study, 8 training sessions were conducted, 3 hours a week for 8 weeks were carried out. Each lesson began with a problem containing a geoecological orientation. During classes, students participate in such processes as determining the problem, collecting the necessary information to solve it, determining the hypothesis and developing ways to solve the problem.

Literature review

Competence is understood as a characteristic of a person, which, in content and structurally and functionally, is interconnected with the worldview, consciousness, thinking, behavior, ecological culture.

The problem of the competence of the personality and its development is the subject of a number of psychological and pedagogical studies. The formation of the competence of the future teacher of geography is based on the competence-based learning approach (Makoedova, 2007).

The problem of modernization of professional education based on competence-based learning approach is considered in the works of Khutorskoy (2013), Zeer (2002).

Thus, B.T.Kenzhebekov, F.Mizambaeva turn much attention to the formation of key competencies of the future specialist, necessary for the successful self-realization of the individual in professional activity (Kenzhebekov, 2001; Mizambaeva, 2019).

Reynolds & Salters (1995) point out that the formation of competencies as the basis for teaching and training teachers is a natural process. They distinguish three types of competencies depending on:

- professional orientation;
- the ability to be creative and flexible;
- acquired knowledge and their understanding.

Each type is considered in accordance with the acquired knowledge and their understanding, methods and forms of training. It is the competence-based learning approach in professional training that contributes to the formation of the necessary competencies of future teachers (Reynolds& Salters, 1995).

Separate works are devoted to the formation of environmental competence of students in the process of natural science directions in the system of higher (Makoedova, 2007), general (Kazakova, 2004) and additional (Ermakov, 2008) education.

Environmental competence is understood by Ermakov (2008) as "conscious and meaningful acquisition of theoretical knowledge, skills, ways of making decisions, moral standards, values and traditions in the process of natural protection, which has personal and social significance, and the experience of solving environmental problems on this basis".

According to Gagarin (2011) environmental competence as an integrative property of the personality includes knowledge about the environment, ideas about the nature and norms of human interaction with the environment, ideas about nature as the most important value, readiness and ability to solve environmental problems, experience in practical activities to preserve and improve the environment, environmentally significant personal qualities (human character, empathy, frugality and "environmental" responsibility for the consequences of their activities).

The research touches on the psychological and pedagogical features of environmental competence as an element of the professionalism of future teachers, etc. At the same time, the essential and functional content of the concept of "environmental competence", as well as the features of formation and development, are presented by various authors in different aspects (Alekseeva, 2021).

Geoecological competence is defined as the ability of geography teachers to effectively integrate environmental knowledge into the educational process using interdisciplinary approaches. This implies in-depth knowledge of the interaction of natural and anthropogenic systems, skills in environmental risk assessment, and an understanding of sustainable development (Kurolap& Fedotov, 2018).

An important aspect of developing geoecological competence is the creation of favourable pedagogical conditions that provide an optimal learning environment for students and teachers.

Research shows that interdisciplinary links between geography and other sciences such as biology, chemistry and ecology contribute to the development of geoecological competence. Incorporating projects that bring together different disciplines into the curriculum helps geography teachers to teach environmental topics more effectively (Shchitova et al., 2020).

Modern technology plays an important role in building environmental literacy. The use of digital tools such as geographic information systems, climate change models, and online collaborative learning platforms can strengthen the practical orientation of learning and provide skills in working with environmental data (Istomina, 2024).

Results and discussion

The geoecological competence of the future geography teacher includes:

- the cognitive component - the formation of a system of geoecological knowledge (natural science, worldview, regulatory, practical), ways of thinking, acting as an indicative basis for geoecological activity.

- motivational-value component - the formation of value orientations, understanding of the meanings of environmental activity that determine the awareness of the need to preserve the natural environment as the most important value; readiness for active participation in geoecological activities, environmental measures.

- practically the activity component - the ability to practically apply geoecological knowledge when identifying, solving and preventing geoecological problems, improving the state.

The study of the curriculum and program of geographical education made it possible to see the possibilities of forming geocological competence in teaching training courses of a profile cycle such as “General Earth”, “General Geology”, “General Physical Geography of the World”, “Landscape Studies”, “Physical Geography of Kazakhstan”, “Soils Geography”, “Cartography with the basics of topography”, “Methods of field and distance studies”, “Methods of using digital cartographic resources”, “Meteorology with the basics of climatology”, “General hydrology”, “Methods of geoinformation technologies”, “Geotechnological foundations for modeling geosystems”, “Biogeography”, “Local history”, “Sacred geography of Kazakhstan” “Technology of remote sensing of the Earth”, “Fundamentals of Geodesy”, “Geoecology with the basics of environmental management”.

The main task, in connection with the goal, was in the restructuring of the content of various courses in order to strengthen their geoecological orientation in their content, which has a direct access to the formation of geoecological competence.

An analysis of psychological and pedagogical literature on this issue made it possible to conclude that competence is understood as a designation of the educational result of the student for real possession of methods, means of activity, the possession of skills that allow us to achieve the goal. In turn, geoecological competence is an integrative personality quality, involving the use of the acquired environmental and geographical knowledge, skills in a certain situation to solve any problem used in the everyday practical activities of the individual.

Analysis of the content of academic disciplines of theoretical profile showed the availability of topics and issues for the formation of geoecological competence. These topics

include the principles of the integrated characteristics of natural territorial complexes, features of the interaction of man and nature in various physical and geographical regions, the influence of natural factors on resettlement, methods of farming, culture, life and health of people, human ecology and its ratio with geographical sciences, organic. The world, natural resources, the provision of water resources of different regions, land resources and their use, biological resources, a special role in forest resources, measures for the protection and restoration of forests, the most important environmental problems: depletion of resources, air pollution and water supply of balance in natural territorial complexes, other negative consequences of the use of natural resources, the features of these problems and ways to solve them, the degree of change in the nature of different regions in connection with the action of natural and socio-economic factors, cultural landscapes, protection and rational nature use in different the countries of the region, anthropogenic changes in natural complexes, the stability of geosystems, natural-anthropogenic complexes, problems of technogenic pollution, regional and local geographical forecasts, environmental and geographical examinations, information support of various geoecological programs.

The listed topics focus on the problems of practice-oriented geoecological activity, but are insufficient for the formation of geoecological competence of future teachers of geography.

In this regard, we carried out modeling their content within the permissible limits of the variable part, taking into account the regulation of the list of professional geoecological skills related to the solution of a specific geoecological problem arising from the context of the learning topic.

In the course of which they are revealed:

1. Chain reactions in the components of natural and household complexes and between them caused by vertical and horizontal bonds;

2. Differences in the stability of natural, economic complexes to the same influences;

3. Total combinations of various types of influences, changes, consequences in one territory; various temporary intervals in the reaction of nature, economy, population to influence;

4. Qualitative and quantitative connections between influences, changes, consequences of influences.

Interdisciplinary connections were established and special training situations were created on their basis using integrative complex tasks.

For example, according to the course “Geoecology with the basics of environmental management” the module “The influence of human economic activity on environmental pollution” is modeled with the possibility of using the measurements of the portable automatic gas analyzer GANG-4, observations of the distance probing, GIS-technology, the digital professional weather station “Bars”, digital platforms such as Ventusky.com, Meteoblue.com, Airkz mobile applications and others. It gives the opportunity to clearly evaluate the environment of human economic activity for environmental pollution, calculate the spread of chemical or radioactive pollution. By means of them, you can automatically calculate the areas of the injured areas, evaluate the volume of chemical and radioactive precipitation, allocate settlements and other objects located within the dangerous territory. The use of geoinformation systems (GIS) allows you to quickly receive information on request and display it on a cartoon, evaluate the condition of the ecosystem and predict its development. Using GIS, it is convenient to simulate the influence and spread of pollution from point and inaccurate (spatial) sources on the ground, in the atmosphere and on the hydrological network (Istomina, 2024).

The results of model calculations can be applied to natural cards, such as vegetation cards, or on cards of residential arrays in this area. As a result, you can quickly assess the immediate and future consequences of such extreme situations as a spill of oil and other harmful substances, as well as the influence of permanent spot and areas pollutants.

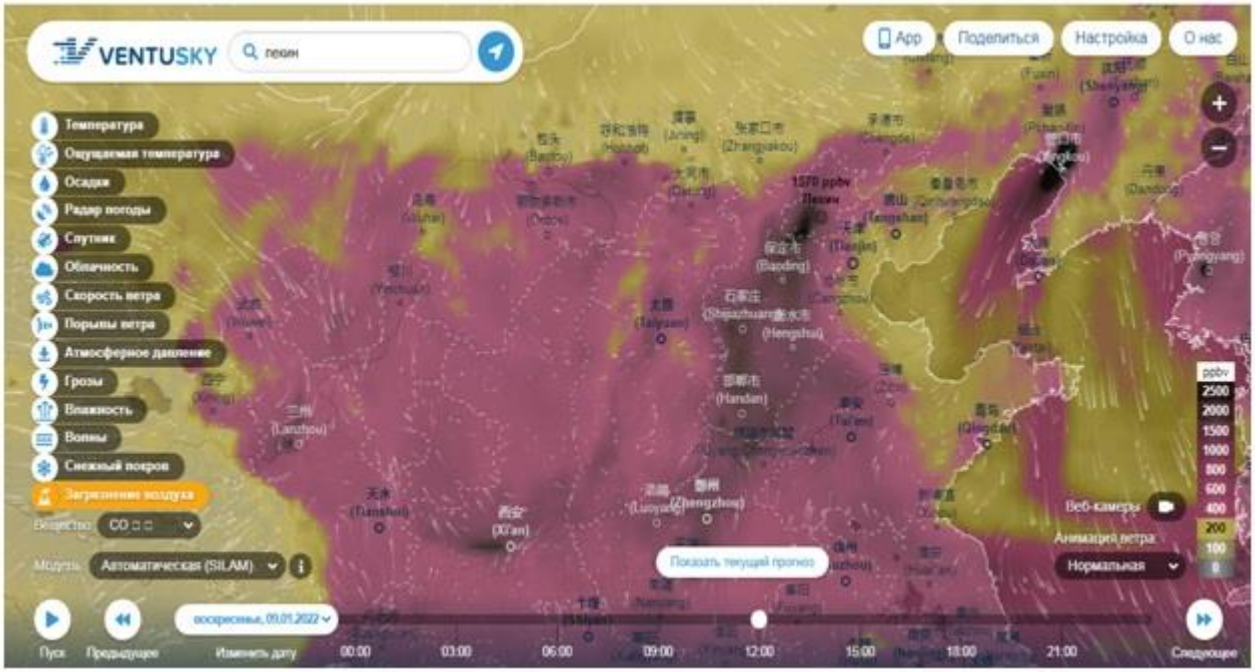
The use of Excel as a database gives significant advantages, it can read a wide range of data formats, provides basic data service functions (Gürbüz & Karadeniz, 2020), data management and analysis of GIS data (including access to input data, storage of intermediate and output data, positions for writing reports, diagrams, Pictures and other analytical representations of data).

Thanks to these components, students, working in a team, integrating the knowledge of chemistry, ecology, computer science, cartography, can identify the content of pollutant harmful substances, the causes of their formation and the main sources of pollution, as well as graphically process, analyze and evaluate the quantitative data obtained under determining the main sources of environmental pollution and propose ways to solve geoecological problems, which leads to the formation of geoecological competencies of future geography teachers.

For example, students using an interactive map determine the air temperature, air pollution levels PM2.5, PM10, NO2, SO2, O3, CO, AQI, the impact of dust in the world over the past 50 years. Analyzers influencing factors determine the most polluted areas. For example, a high indicator of carbon dioxide and sulfuric acid was detected in the territory of Southeast Asia, including China (Figure 1).

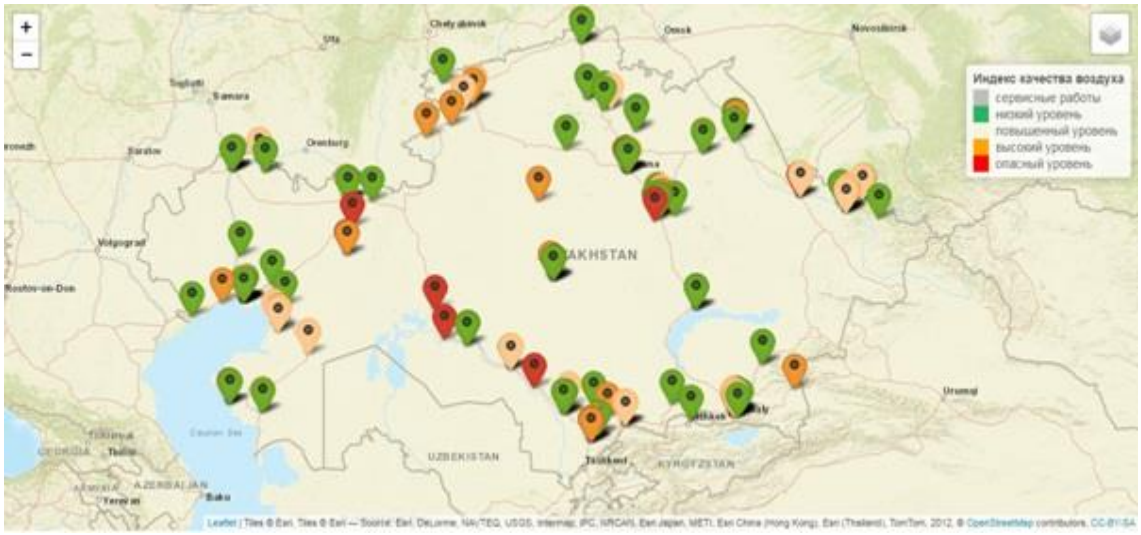
Figure 1

Digital platform ventusky.com



Having analyzed the causes of a high -tech indicator, it was determined that the region is affected by a large concentration of industry and a high population. And to identify factors affecting the territory of Kazakhstan, students used the Airkz mobile application (Figure 2).

Figure 2
Airkz mobile application



Special educational tasks were also developed with the expectation of the formation of geoecological competence (research orientation, the ability to choose the correct production solution based on analysis, synthesis, generalization, etc.mental operations, have sufficiently developed intuition).

The completeness of methodological support was backed up by the conduct of test measurements in order to assess the achieved educational result of the formation of geoecological competence.

For this, the main levels of the formation of the geoecologic competence of students were determined. Very low, low, medium, high, indicators of which were mental abilities, values motivating in action, the ability to apply knowledge and skills in practice. In the experiment, 58 students were accepted, who were divided into two groups: experimental and control, the experiment was conducted in two stages: stating and forming. At the formative stage of the study, additional information-digital materials of geoecological content were used.

The dynamics of a change in environmental knowledge to the stating and forming stages of experimental work in control and experimental groups is presented in figures 3 and 4.

Figure 3

The dynamics of the formation of geoecological knowledge of students of control groups at the stating and forming stages (%)

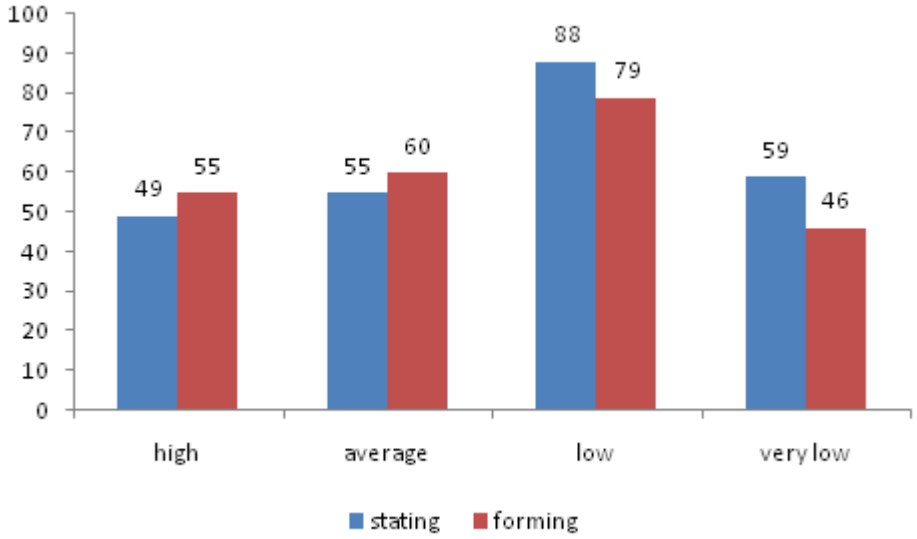
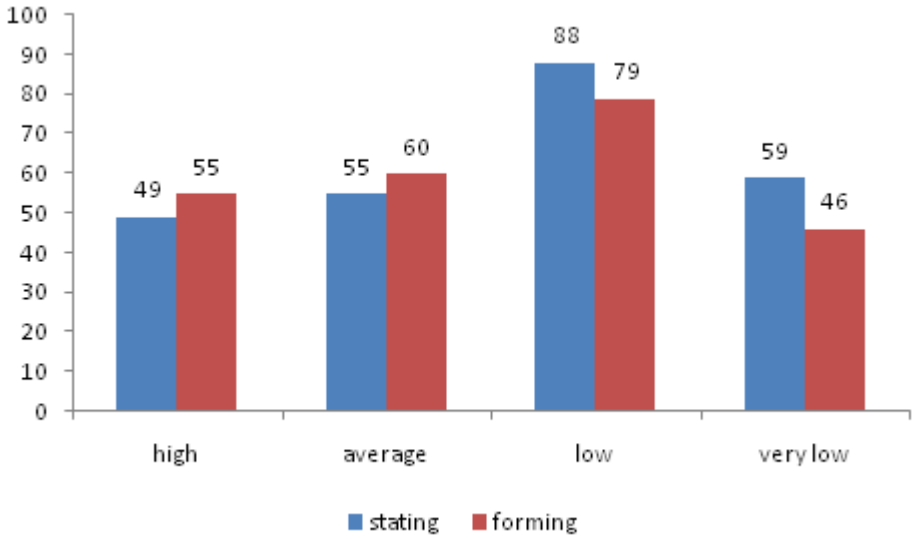


Figure 4

The dynamics of the formation of geoecological knowledge of students of experimental groups at the stating and forming stages (%)



If in the control class the changes were insignificant and made an increase in an increase in the high level of manifestation of environmental knowledge by 6%, then in the experimental class it grew significantly - by 38%and amounted to 89%.

Based on the results of test measurements, the formation of geoecological skills at the forming stage of the experimental group was revealed.

The results obtained allow us to talk about the effectiveness of the developed methodology for the formation of geoecological competence in the process of studying objects of the profile cycle.

It should be noted that this study has limitations as it was conducted on a sample of 58 students from one faculty within one institution. In this regard, it is not possible to generalise the findings to all students in general.

Conclusion

As the study shows, the formation of competence in practice requires a systematic approach, that is, the transformation of components of content based on the use of technologies, the necessary to form students in a sufficient level of competence. The study set a goal to determine the optimal pedagogical conditions for the formation of geography teachers' competence in the learning process.

The study of the modular educational program of the Higher School of Natural Sciences, the pedagogical experience of the author in the preparation of geography teachers made it possible to see the possibilities of forming competence in teaching educational courses of the professional cycle. The implementation of these capabilities was associated with the definition of pedagogical conditions that must be developed and ensured for the effective formation of geography teachers' competence.

As part of research, it was revealed that the educational disciplines of the professional cycle have great potential in the formation of geography teachers' competence. The abundance of educational material of a orientation sets the task of more careful selection and structuring of the content of the curriculum in order to increase the effectiveness of the formation of competence.

Many professionally situations can also be modeled in the system of setting comprehensive integrative tasks and various tasks of and practical orientation.

As recommendations for future research, we can propose an in-depth study of the effectiveness of geography teacher training programmes in improving geo-ecological competence, with a focus on those elements of the programmes that have the greatest impact on the development of skills. In addition, scientific and methodological support of the process of geo-ecological competence formation requires extensive research aimed at developing criteria and indicators of its assessment, determining the levels of its formation, methods of control, as well as finding out its role in the system of education quality indicators, creating tools for measuring geo-ecological competence. Further work in the proposed directions can significantly expand knowledge in the field of geo-ecological competence and contribute to the improvement of the quality of education.

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MODEL OF STUDENT PREPARATION IN HIGHER EDUCATION IN THE CONTEXT OF BIG DATA

Abstract: Developing a robust educational system across all domains is essential for providing contemporary educational programs. The aim of our research work is to identify and practically implement the theoretical foundations of preparing students in the field of big data in higher education, which is the cornerstone of training a modern, competitive future specialist.

Ensuring the high-quality organization of fundamental disciplines is crucial in developing specific competencies for future educators. Therefore, the main focus of the proposed article is on shaping an educated individual with a broad outlook and high culture of thought in preparing IT specialists at the L.N. Gumilyev Eurasian National University. The article provides a comprehensive definition of the model of student preparation in higher education in the context of big data, outlines and implements components, and discusses the model for achieving positive outcomes. Before considering the model for improving student preparation in the context of big data, let us briefly define big data and examine the concept of a model.

Keywords: pedagogical model, big data, data processing, goal-oriented block, content-organizational block, experimental-summarizing block.

Introduction

Presently, all developed nations have established a systematically structured framework for high-quality education. Generally, the primary goal of the education system is to create appropriate conditions for professional development and personality formation based on scientific and educational achievements, the digitalization of education, the implementation of new teaching technologies, and integration into international global communication networks. To establish a high-quality education system in all spheres of education in our country, it is important to offer modern educational programs. According to the Law "On Education" important issues such as "developing each learner in accordance with their individual abilities, nurturing their talents and abilities" are considered. To address these challenges, highly qualified professionals proficient in information technology, professionally seasoned, and adapted to the modernization of the education system are needed (Parliament of the Republic of Kazakhstan, 2007).

The aim of our research work is to identify and practically implement the theoretical foundations for preparing future educators in the field of big data related to information and communication technologies at the university level, which serves as the basis for the training of modern, competitive future specialists. Preconditions for training modern competitive professionals are provided in the national project "Quality Education - Educated Nation" (Government of the Republic of Kazakhstan, 2021).

Additionally, the typical operating rules for educational organizations outlined by the Ministry of Education and Science of the Republic of Kazakhstan include requirements for training competitive professionals in higher and postgraduate education (MES RK, 2013).

In recent times, there is a need in the training of specialists to monitor and supplement modern educational content in accordance with scientific, technical, technological, and informational changes. Due to the continuous growth of information, universal tools and solutions covering all areas are required.

One of such pertinent topics is related to the processing of big data. With the big data, information that cannot be processed using traditional data management methods can be processed quickly and securely.

The development of intensive technological innovations has facilitated the work of applicants in universities and colleges, as it has increased the desire to bring them to the market. To admit the largest number of applicants enrolled in higher educational institutions, they implement actions such as analysis, access to and management of large amounts of data.

Currently, educational organizations have complex ways of collecting data about students and responding to them, enabling them to clearly navigate their educational situation more than ever. Thus, amidst intensified competition and rising educational costs for students, the pool of prospective learners remains limited. Additionally, global leaders in the field of education utilize big data processing tools for business analytics, financial analytics, predictive analytics, and strategic management. All of this is driven by a specific motivation to enhance the personal achievements of learners. The primary aim of such actions is to expand the available analytical process and improve the management of its resources. These data sources include student test results, web pages and social media channels, cameras, website browsers, and mobile devices. To address these aforementioned tasks, big data are utilized. This, in turn, helps save time and avoid any errors. Various methods of utilizing big data in educational organizations are being considered (Utemov, 2018).

Prinz, A., Engebretsen, M., Gjøsæter, T., Møller-Pedersen, B. & Xanthopoulou Th.D. (2023).

Research methods and organization

Considering the provision of a methodical system in teaching big data. To do this, let's highlight the conditions for the functioning of the model of teaching methods for big data.

Modeling is one of the most relevant methods of scientific research and is widely used in various studies. The method of modeling allows for the integration of empirical and theoretical aspects in scientific research, i.e., integrating experiment, logical structure construction, and scientific abstractions in the process of studying a pedagogical object. The Philosophical Dictionary indicates that modeling is the representation of characteristics of a specific object in another object for the purpose of studying it (Van Der Valk et al., 2007).

Prinz et al. (2023) in their research stated that models, where a model is just a system that is analogous to another system, called a referent system . The similarity is typically brought about by using a matching perspective for the two systems. A model is an object that retains only the most important properties of a realistically existing object or system and is intended for their study.

Researcher Beshenkov (200) believes that a model is an artificially created object in the form of diagrams, physical constructs, symbolic forms or formulas that, being similar to the studied object, defines the structure, properties, and relationships between the elements of the object, both simply and complexly and demonstrates them in the form of symbolic forms or formulas.

A model defined by Kogalovsky (2009) is an abstract representation in a certain form (e.g.mathematical, physical, symbolic, graphical), intended to represent certain aspects of its real-world counterpart and to provide answers to the studied questions.

An educational model is a logically consistent system of corresponding elements, including the aim of education, content, pedagogical technologies, and management

technologies of the learning process, as well as curricula and programs. Dakhin (2003) asserts that in the process of studying education, educational models are created.

Kozyreva (2020) believes that pedagogical modeling determines the possibilities of clarifying the used scientific knowledge by teachers in the system of lifelong education and creating new scientific knowledge as a product of theorization, development of anthropologically determined relationships and focused on innovative and productive functioning of environments.

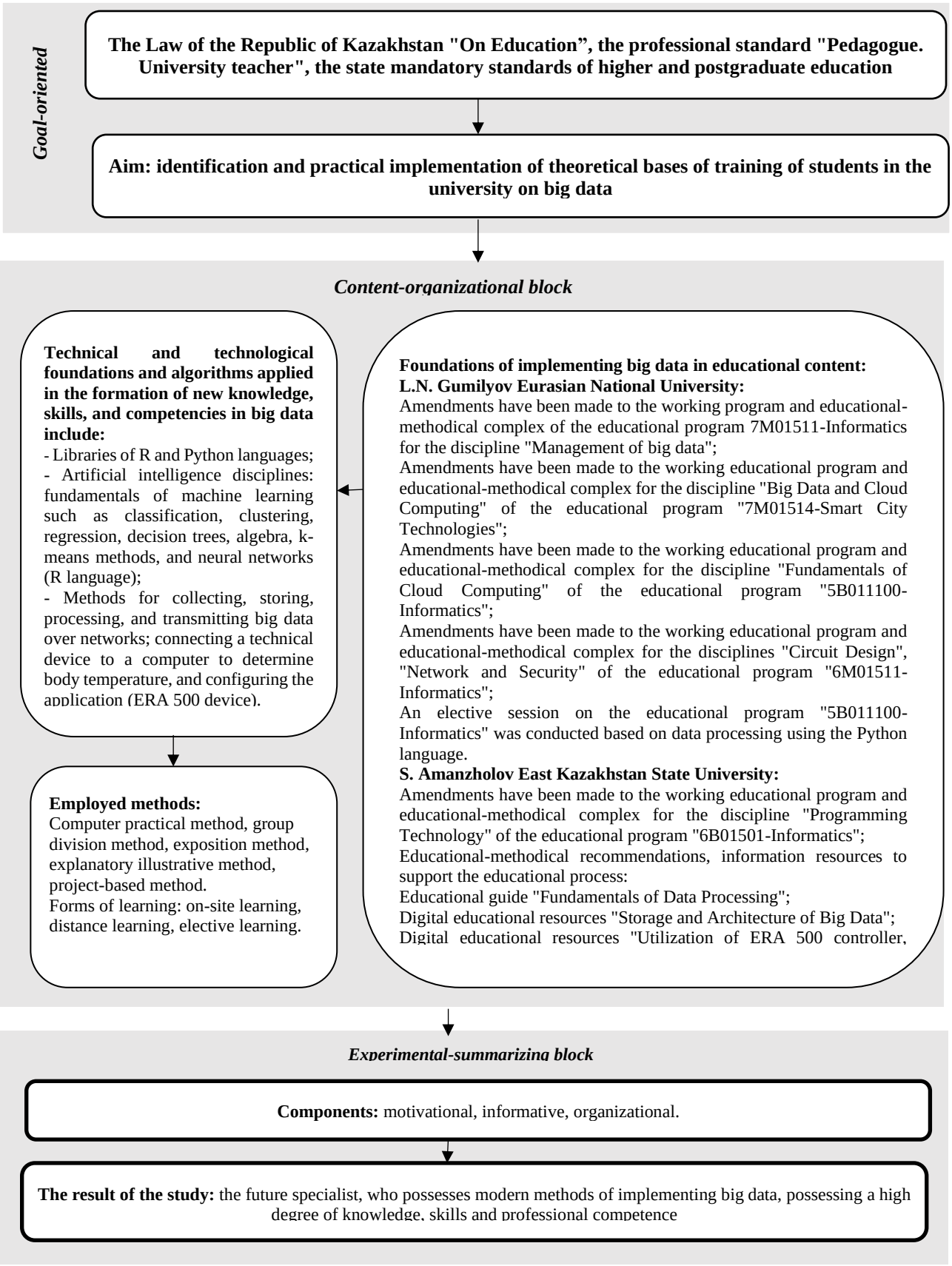
Systematizing the reviewed definitions, it can be stated that a model is a tool for representing information about a phenomenon or an object in the form of a diagram. The model for teaching big data comprises a set of components that characterize the level of teaching methods, their interrelationships, principles, tools, and organizational forms for teaching big data. Based on the analysis of big data, it is necessary to create an educational environment for all entities and subjects of a higher education institution in such a way as to develop the professional competence of a future specialist. Considering the concept of a model, the structure of the developed model includes elements of practically implementable situations that form the professional competence of the specialist. As a result of the analysis of scientific literature on big data, a deficit of national research on training future ICT specialists has been identified. Based on this, in accordance with the state mandatory standard of higher education of the Republic of Kazakhstan, a model necessary for this direction in higher education institutions has been developed and tested, and the need for practical conditions has been determined. Therefore, in accordance with this, a model for teaching big data has been developed and justified through a pedagogical experiment.

The results of the study and discussion

Before delving into the research work model, let us first consider the concept of big data. Big data refers to big data characterized by high velocity of accumulation or alteration, necessitating cost-effective and innovative data processing methods. These methods enable enhanced comprehension of information, which in turn facilitates decision-making and process automation (Abdalla, 2022). Based on the given definition, the components of the model developed in accordance with the aims and objectives of the research consist of: a goal-oriented component, a content-organizational component and an experimental-summarizing component. The foundation is built upon state programs that underscore the relevance of the topic, the Law of the Republic of Kazakhstan "On Education", the professional standard "Pedagogue, University Teacher", as well as the requirements imposed on modern information and communication technologies in the field of education (Figure 1).

The proposed model is based on and created from big data and is intended to enhance the preparation of students enrolled in the educational programs "7M01514-Smart-City Technologies", "5B011100-Informatics", "6B01511-Informatics", "7M01511-Informatics" at the L.N. Gumilyev Eurasian National University and "6B01501-Informatics" at S. Amanzholov East Kazakhstan University. The content and structure of the model have been developed by maintaining a logical coherence that encompasses the educational process and the entirety of the given specialization.

Figure 1
Model for improving student training of Big Data



A model was created to implement the research work, which includes theoretical, practical, educational-methodological and experimental foundations, were defined accordingly its structure and content. For this purpose, we classified the elements of the model into three blocks:

1. Goal-oriented block,
2. Content-organizational block,
3. Experimental-summarizing block.

Let's focus on the content of the specified blocks:

1. Goal-oriented block

This block considers regulatory documents on big data, programmatic needs of society for specialists:

– Law of the Republic of Kazakhstan "On Education".

– Specialization card "University Teacher", based on professional standard "Pedagogue".

– Educational-methodical complexes, working educational programs (syllabi).

– Taking into account the increased demand for specialists proficient in working with big data in society.

Based on the reviewed documents, the educational goal for big data was defined: to identify and practically implement the theoretical foundations of preparing future educators in big data in connection with information and communication technologies at the university level.

Content-organizational block

On the substantive basis of this block, the fundamentals of implementing big data in the educational process of L.N. Gumilyov Eurasian National University in educational content are provided, specifically, the following research work has been conducted:

- Amendments have been made to the working educational program and educational-methodical complex for the discipline "Big Data and Cloud Computing" of the educational program "7M01514-Smart City Technologies". This discipline has been integrated into the educational process based on the implementation of a project related to Smart City technologies under the Erasmus+ program. The total credit volume of the discipline is 5 credits (Lecture - 1 credit, Practical session - 2 credits, student's independent work- 2 credits). The discipline was conducted according to the educational program and schedule of classes; an analysis of its content was carried out and amendments were made based on a specialized course (Table 1).

Table 1

Lecture topics included in the content of the discipline "Big Data and Cloud Computing".

Lecture topics	Volume of hours
Big Data. Concepts of Big Data. Technologies for storing and processing Big Data.	1
Chronology of the formation of the concept of Big Data. Analysis of Big Data.	1
Applications of Big Data. Areas of application of Big Data.	1
Advantages and disadvantages of Big Data. Challenges in using Big Data.	1
Directions, principles, stages of Big Data management. Evolution of organizational fundamentals in managing large-scale datasets.	1
Collection, storage, processing of Big Data. Import and export of Big Data. Examples.	1
Total:	6

Based on practical sessions on lecture topics from a specialized embedded course, the formation of skills and abilities in handling Big Data among students has been achieved.

Experimentally-generalizing block

To assess the level of new skills and knowledge enhancement among students, motivational, substantive, and organizational components were selected. One of the tasks was to conduct surveys using identified indicators for each component and their criteria, and to provide evidence of the accuracy of the forecast generated from the research work. In our research work, we selected indicators and criteria for the motivational component as follows: interest in working with Big Data using organizational forms of education, fostering students' new knowledge through self-motivation; ability to work with Big Data in the university, programming through calculations using Python, R programming environments.

During the development of educational and methodological materials, instructional support for lecture and practical courses on Big Data was prepared. It is assumed that the proposed set of organizational and pedagogical conditions will contribute to the effective formation of the investigated qualities during their implementation in the pedagogical process.

The theoretical understanding of Big Data as indicators and criteria of the substantive component of our research is formed based on the target component and is implemented in the training of students as professionals in accordance with the Law of the Republic of Kazakhstan "On Education", the professional standard "Pedagogue. University Teacher", relying on the requirements of state programs for the development of education and science of the Republic of Kazakhstan (MES RK, 2022).

Indicators and criteria of the organizational component encompass forms, methods, and learning technologies designed to enhance students' knowledge levels and achieve the goals and objectives of education productively.

Conclusions

The criteria for the motivational, substantive, and organizational components, prepared to assess the levels of knowledge and new skills formation among students, are selected as follows:

–Mastery of Big Data within the motivational component and understanding its future importance.

–Criterion of high theoretical understanding of Big Data within the substantive component.

–Criterion of proficiency in action and mastery of methods, techniques, and forms of teaching related to Big Data within the organizational component.

Justified the rationale for the forecast set as a result of implementing the model for preparing students in Big Data in our research work, i.e., at the higher education institution.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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DEFINING THE ROLE OF EDUCATIONAL PLATFORMS IN MATHEMATICS IN THE EFFECTIVE TRAINING OF FUTURE MATHEMATICS TEACHERS

Abstract: The present study analyzes the results of a survey of teachers and students designed to identify the preferences and needs of universities in using educational platforms in mathematics to study the subject «Elementary Mathematics». The aim of the study was to determine the preferred characteristics and functionality of mathematics learning platforms that can contribute to effective learning and increase interest in mathematics for future mathematics teachers. To achieve this goal, questionnaires were developed, which were distributed among mathematics teachers and first-year students in the specialty «Mathematics» when teaching the subject «Elementary Mathematics» and third and fourth-year students when teaching the subject «Methods of teaching mathematics». The questionnaires included questions about preferences in using educational platforms in mathematics, the level of comfort and perception of educational material when working with technologies, preferred learning formats and expected learning outcomes. The analysis of the obtained results allowed us to identify the key principles that should be taken into account when using educational platforms in mathematics to study the subject «Elementary Mathematics» at the university. Following these principles contributes to the use of educational platforms in mathematics, and as a result, to improving the quality of mathematical education at the university and improving the learning ability of future mathematics teachers.

Keywords: elementary mathematics, educational platforms in mathematics, methodology, university, student, education technology, questionnaire.

Introduction

In modern education, the use of math learning platforms and online resources is becoming increasingly common and important. One of the areas where mathematics learning platforms can have a positive impact is mathematics education, in particular the training of future mathematics teachers in «Elementary Mathematics». «Elementary mathematics», being one of the key subjects at the university in the specialty «Mathematics», «Mathematics-Computer Science», requires innovative approaches to teaching in order to increase the interest of future mathematics teachers and improve their academic performance (Rozmat, et al., 2022; Tulentaeva et al., 2023).

In this study, the main focus is on the analysis of questionnaires filled out by future mathematics teachers in order to determine preferences and needs in using educational platforms in mathematics for studying «Elementary Mathematics», «Methods of teaching mathematics» at the university. The research is aimed at identifying key factors that can contribute to future mathematics teachers' effective learning and increasing interest in mathematics, the importance of teaching «Elementary Mathematics», «Methods of teaching mathematics», the role of educational platforms in mathematics in this process is considered, and the relevance of analyzing questionnaires to understand the needs of teachers and students in using educational platforms is substantiated in mathematics.

Methodology

The main thing is to collect data material for the current study, and to conduct a survey of teachers and students. Two questionnaires have been developed for this purpose. The first questionnaire was intended for mathematics teachers. The second questionnaire was used by the students. The questionnaires included questions related to identifying their experience in using math learning platforms, their functions, preferred learning formats, and expectations (Yunanova, 2016; Chekalina et al., 2018).

The study was conducted among two groups of participants. The first group consisted of 17 mathematics teachers working in various educational institutions. The second group included 56 students enrolled in the same institutions as the teachers.

The survey among teachers was presented in the format of an online survey available through a specialized platform. The questionnaire questions were aimed at researching the following:

- Experience using platforms for learning mathematics, including specifying specific platforms and the frequency of their use.
- Evaluation of the usefulness of various platform features, such as videos, tests and interactive tasks.
- Preferred learning formats (individual lessons, group lessons, mixed learning).
- Expectations from the use of platforms, including expected changes in interest in the subject and academic performance.

The second survey was also conducted in the format of an online survey, but it was adapted for schoolchildren.

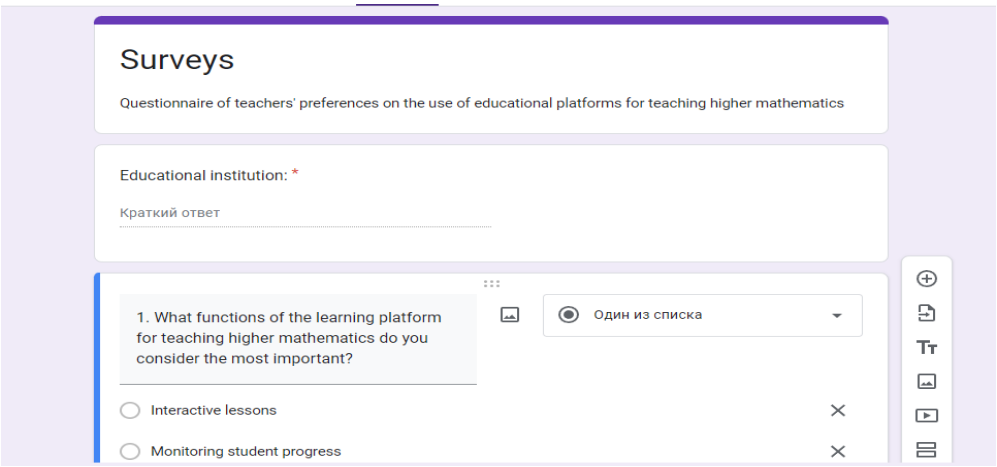
The questionnaires were sent to the participants by e-mail to teachers and through school groups in messengers to students. The participants received two weeks to complete the questionnaires, which provided sufficient time for answers.

The collected data was encoded for quantitative analysis. Qualitative responses are analyzed using content analysis to identify key themes and patterns.

All participants in the study were informed about the objectives of the study and provided with a guarantee of anonymity. The results obtained will be used exclusively for research purposes, which meets ethical standards.

The survey was conducted on the basis of the Google Forms platform. The interface of the questionnaire is shown in Figure 1.

Figure 1
Questionnaire interface



Future university mathematics teachers from various regions of the country took part in the survey. The survey was conducted anonymously.

The purpose of the survey was to identify the main trends and preferences related to the use of educational platforms in mathematics by the participants of the questionnaire. To interpret the results for the survey, a statistical analysis of the data was carried out using appropriate methods, including descriptive statistics, correlation analysis, etc. These methods made it possible to conduct a comprehensive analysis of the preferences and needs of teachers and trainees in using educational platforms in mathematics to study "Elementary Mathematics", "Methods of teaching mathematics" at the university and formulate the main conclusions and recommendations for the further vector of development of educational platforms in mathematics in the educational process (Abroskin et al., 2022; Belyakov et al., 2021).

The method of self-checking the independent work of future mathematics teachers in solving mathematical problems in "Elementary mathematics".

For example, the analytical solution of the following problem in "Elementary Mathematics" can be independently verified using the mathematics learning platform.

Task 1. Solve the system of equations and check the answer using the GeoGebra math learning platform

$$\begin{cases} 3x^2 - y + 1 = 0 \\ 3x - y + 7 = 0 \end{cases} = \begin{cases} 3x^2 - y + 1 = 0 \\ 3x - y + 7 = 0 \end{cases} = y = 3x + 7 = 3x^2 - 3x - 6 = 0 \div 3 = x^2 - x - 2 = 0$$

$$D = \pm\sqrt{b^2 - 4ac} = \pm\sqrt{(-1)^2 - 4 \cdot 1 \cdot (-2)} = \pm\sqrt{1 + 8} = \pm\sqrt{9} = \pm 3$$

$$x_1 = \frac{1+3}{2} = 2,\ x_2 = \frac{1-3}{2} = -1\ .$$

$$y = 3x + 7, \quad y_1 = 3 \cdot 2 + 7 = 13, \quad y_2 = 3(-1) + 7 = 4$$

Answers: $(\cdot)A(2;13), \quad (\cdot)B(-1;4)$

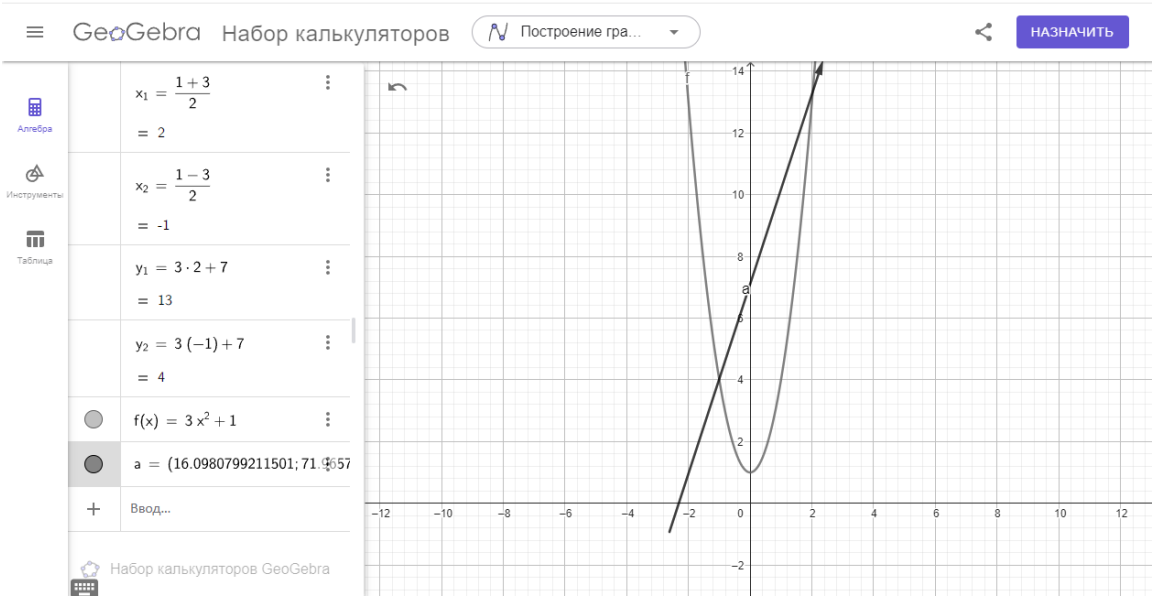
2) Verification by the GeoGebra learning platform (Figure 2).

$3x^2 - y + 1 = 0,\ y = 3x^2 + 1$ 3x-y+7=0, y=3x+7

X	Y
0	1
-1	4
1	4
2	13
-2	13

X	Y
0	7
1	10
-1	4
-2	1
2	13

Figure 2
GeoGebra calculator set



Results

As a result of the conducted surveys, data were obtained from 17 teachers and 56 students. The analysis of the answers revealed key trends and differences in the perception of platforms for studying mathematics.

76% of teachers reported that they actively use platforms to study mathematics in their practice.

The frequency of using the platforms varied: 41% of teachers used the platforms daily, 35% — several times a week.

85% of the students confirmed that they use platforms to study mathematics.

60% of students use the platforms on a daily basis, which indicates a high level of engagement.

In the answers of teachers to the question about the most useful functions of the platforms, the leaders were: interactive lessons (70%), monitoring of academic performance (60%), individual training (55%).

The students identified the following functions: A game approach (80%), Video tutorials (65%), Discussion forums (65%).

The majority of teachers (82%) expect that using platforms will increase students' interest in mathematics and improve their academic performance.

75% of the students expressed the hope that using the platforms would help them better understand the material and prepare for exams.

A comparative analysis of the responses from teachers and students showed that despite common preferences in using platforms, each group has its own accents. Teachers focus on functionality and methods, while students appreciate the interactivity and accessibility of materials. This difference highlights the importance of taking into account the views of both groups in the development and implementation of educational technologies.

As a result of the survey, the following quantitative characteristics were identified. More than 70% of teachers prefer to use educational platforms in mathematics with the ability to create interactive lessons. 60% of teachers consider it important to have a monitoring system for students' academic performance on the platform. Most of the teachers expressed interest in using tools for individualized learning. Table 1 and Figure 3 contain a tabular and graphical representation of the results of the teacher survey.

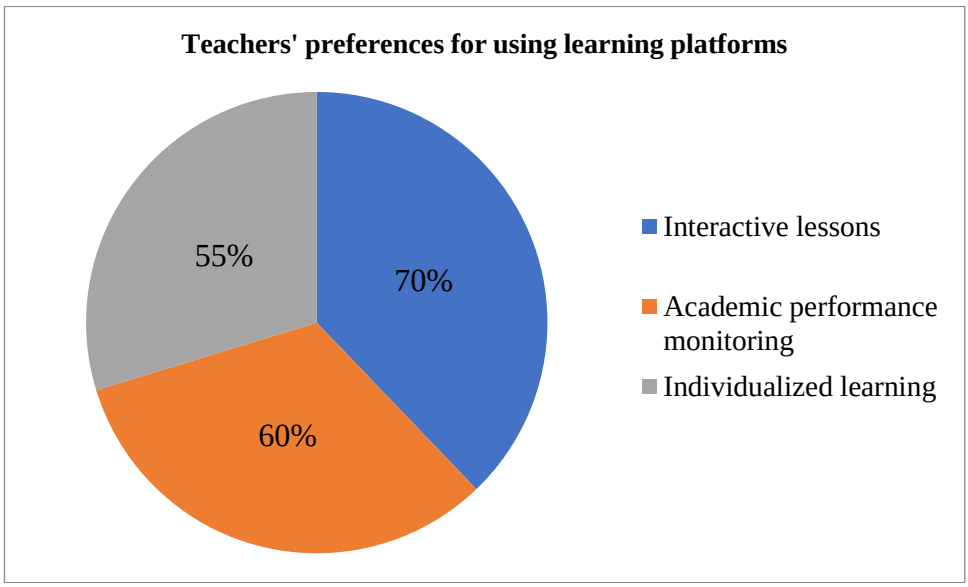
Table 1

Results of the teacher survey

Category	**percent**
Interactive lessons	70%
Academic performance monitoring	60%
Individualized learning	55%

Figure 3

The results of the teacher survey

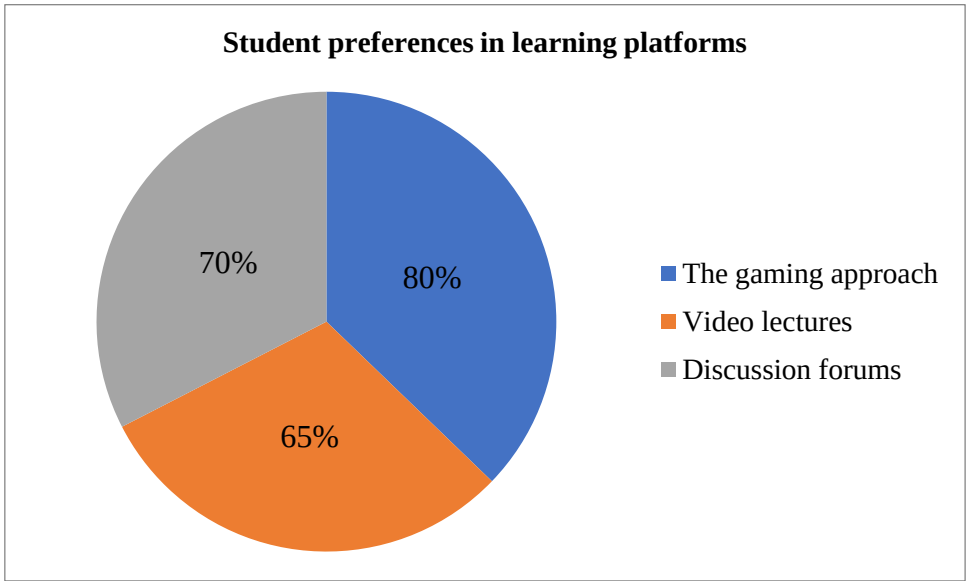


More than 80% of students would prefer learning platforms with a playful approach to teaching mathematics. About 65% of the students expressed a desire to have constant access to educational materials in the form of video lectures. Most students stressed the importance of having online forums to discuss math issues with teachers and peers. Table 2 and Figure 4 contain a tabular and graphical representation of the results of the student survey.

Table 2
The results of the student survey

Category	**percent**
The gaming approach	80%
Video lectures	65%
Discussion forums	70%

Figure 4
Results of the student survey



Summarizing the results of the survey, it can be argued that a larger percentage of both teachers and students are interested in integrating educational platforms into the process of teaching mathematics.

Discussion

Analyzing the results of the survey, it can be concluded that future mathematics teachers are highly interested in using educational platforms in mathematics in classes on «Elementary Mathematics», «Methods of teaching mathematics».

The integration of learning platforms in mathematics can bring great benefits to teachers by using them, making their learning process more interesting and interactive and, as a result, increasing the effectiveness of the learning process. The main aspects of mathematics learning platforms that are most attractive to teachers is the ability to support individualized learning. Teachers also appreciate the high level of interactivity provided by educational platforms in mathematics.

At the same time, the interviewed teachers acknowledge the insufficient amount of study time devoted to the use of educational platforms in mathematics. Also, in some universities, the integration of educational platforms in mathematics is hampered by technical reasons, such as the lack of finances for the purchase.

The majority of students demonstrate a positive attitude towards the use of educational platforms in mathematics. From their point of view, the use of educational platforms in mathematics makes it easier to master educational material compared to the traditional

approach to learning. One of the main aspects most appreciated by students is the possibility of a game approach.

The results of the survey showed that the integration of educational platforms in mathematics into the educational process can significantly improve its quality, interest and academic performance of students. Therefore, it seems advisable to increase the number of academic hours devoted to the use of educational platforms in mathematics.

Conclusion

During the analysis of questionnaires from teachers and future teachers of mathematics on the use of educational platforms in mathematics in the study of «Elementary Mathematics», «Methods of teaching mathematics» at the university, key preferences and needs were identified that should be taken into account when developing and implementing such educational platforms in mathematics. Teachers and future math teachers highly appreciate the interactivity, academic performance monitoring, and individualized learning opportunities provided by math learning platforms. They also demonstrate a high level of readiness to use educational platforms in mathematics, as a self-test of students' independent work in their educational process, which was considered on a specific example as a problem in «Elementary Mathematics».

The results of the survey showed the need to increase the amount of hours devoted to educational platforms in classes on "Elementary Mathematics", "Methods of teaching mathematics" at the university.

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THE ROLE OF TEACHER TRAINING IN FACILITATING THE ADOPTION OF DIGITAL TECHNOLOGIES IN ART EDUCATION

Abstract: As technology plays an increasingly prominent role in education, the undeniable need for training programs aimed at equipping teachers with digital technology skills in art education becomes evident. This case study, conducted within the Abai Kazakh National Pedagogical University framework, examines teacher training programs, the challenges teachers face in integrating technology, and art faculty members' learning motivations and preferences. The research employs a descriptive survey, utilizing a questionnaire to collect data. Participants included 25 art professors from the Art Education, Graphic Design, and Visual Arts departments, who responded to questions about teaching methods across three areas: experiential learning, self-directed learning, and institutional learning. The results indicate that the teachers' level of self-directed learning, with an average of 3.7, was higher than experiential and institutional learning. This suggests that teachers are making considerable personal efforts to improve their skills. Additionally, they rated the necessity of institutional training programs as 4.0 (very high), though the challenges they face when using technology were rated at 2.9. The findings reveal that teachers' academic rank influences their perspectives on digital technologies. These insights can help pave the way for educational institutions in Kazakhstan to develop more technology-driven curricula in the future.

Keywords: teacher training, digital technology, art education, educational institution

Introduction

Research has shown that one of the critical factors for improving the performance and progress of students is the quality of teaching and teachers' knowledge (Rowe, 2003). Given the growth of technology and the myriad tools for information acquisition, the teacher is no longer the sole source of information but remains an essential element for student education (Santos et al., 2016). Educators advance professionally by engaging with new learning and teaching methods and incorporating the latest tools and knowledge. Updating and synchronizing with new technologies is crucial for professional development and enhancing the quality of teaching and student learning. With the growing use of technologies in all aspects of life and education, the first step towards the effectiveness of teachers is to have a high level of knowledge in technology-enhanced teaching and the ability to convey information most effectively. In the field of art education, which is no exception and is even more closely related to technology than other subjects, a good teacher must be able to identify and employ the most suitable teaching methods using technologies for each specific art subject. They should be capable of implementing teachings encompassing a wide range of new strategies and technology-enhanced teaching methods. To achieve this, teachers must stay continuously informed about research and engage in ongoing professional development, upgrading their skills and knowledge to integrate the latest tools and technologies into art education.

Background

Technologies have become ingrained in our daily lives, and educational systems, mainly information and communication technologies, can potentially transform teaching and learning methods in the classroom (Lawrence, 2013). While digital technologies are changing all

aspects of life, including education, the literature indicates obstacles to successfully integrating digital technologies in education. Based on past reviews, Balanskat, Blamire, and Kafal (2007) they categorized successful implementation barriers of technology in education into three levels: teacher, school, and educational system (Lawrence & Tar, 2018). They identified and examined factors that positively or negatively influence teachers' acceptance and integration in the teaching and learning process. They created a model for accepting and integrating information and communication technology that considers teacher, technology, and organizational levels. Additionally, Lim and Chai (2008) investigated how teachers are influenced by organizational factors and attitudes toward technology in integrating information and communication technologies into teaching methods. In another study, Sherry and Gibson (2002) suggested that assessing successful integration aspects of technology in teaching methods should examine personal, technological, organizational, and institutional factors.

Problem statement

While numerous studies have been conducted on the role of teacher training in education, the present research focuses on examining the critical role of teacher training in facilitating the integration of digital technologies in art education. In an era of rapid technological advancement, understanding how educators can effectively incorporate digital tools into art education is crucial. Conducted within the specific framework of the Abai Kazakh National Pedagogical University, this research provides an opportunity for an in-depth exploration of the dynamics of teacher readiness and its impact on the adoption of digital technologies in art education. The study delves into the complex dynamics of teacher training and its influence on enhancing the acceptance of digital technologies in art education. By examining various avenues of teacher training, their challenges in technology adoption, and art teachers' motivations and learning preferences, such studies contribute to a broader discourse on integrating technology in education and provide valuable insights relevant to the field. These insights can inform policies and actions at the Abai Kazakh National Pedagogical University of Kazakhstan.

Objectives

The objectives of this study regarding teacher training methods in art for the utilization of digital technologies are multifaceted. In the first stage, this study examines the educational programs and teacher training at the university under study, focusing on how they address the integration of digital technologies in art education. This involves investigating current teaching methods and evaluating teachers' perceptions of these methods. In the second stage, the research attempts to assess the effectiveness of different teaching methods and explore the role of teachers' academic rank in selecting teaching approaches. The third stage of this study delves into understanding the unique challenges instructors face in this context. The following items guide this research:

- Investigating the instructional methods in the training of teachers regarding the utilization of digital technologies in art education.
- Exploring the challenges faced by teachers in the implementation of digital technologies.
- Examining the role of teachers' academic rank as a factor in their preparedness for training courses related to digital technologies.

Ultimately, this study aims to provide targeted recommendations for enhancing teacher training programs at the Abai Kazakh National Pedagogical University by understanding instructors' unique challenges. Additionally, it aims to offer valuable insights that can inform evidence-based policies and approaches, fostering a more innovative and integrated outlook on technology in art education at the university.

Literature review

In a world undergoing a digital transformation, the emergence of digital technologies has brought about significant changes and developments that have impacted all aspects of life, including education. Consequently, in recent years, there has been a growing demand within educational institutions to utilize information and communication technologies for teaching the skills and knowledge necessary for the 21st century. Considerable attention has been devoted to the advantages of digital technologies in education, and numerous studies have examined the progress made in this field (Moreira et al., 2016; Goeman et al., 2015; Lawrence & Tar, 2018). Studies have shown that integrating technology in classrooms significantly enhances the effectiveness of students' learning outcomes (Zhu & Urhahne, 2018).

Pachler et al. (2010) have also identified the need for experienced human resources in institutions, robust infrastructure, and adequate educational support services as external barriers that affect technology integration. Many studies emphasize the importance of teachers as critical factors in facilitating technology integration in education (Backfisch et al., 2021; Scherer et al., 2019; Vongkulluksn et al., 2018).

Paetsch et al. (2023) investigated that teachers are more successful in integrating technologies into their teaching methodologies when they receive support from administrators and colleagues. Additionally, studies underscore the necessity of enhancing teaching skills using digital technologies and improving teachers' competence in technology-based instructional methods (Martin, 2015; Tondeur et al., 2012).

Voogt et al. (2013) declared that digital technologies in education present challenges that have affected educational institutions and teachers, necessitating examining what needs to be learned and creating technology-centric teaching methods. They also attribute the lack of teachers' readiness and the lack of systematic attention to teaching and learning strategies to the reasons for the unsuccessful integration.

According to Joo et al. (2018), teachers with meaningful and positive experiences can incorporate technology into education and show tremendous enthusiasm in demonstrating its benefits. Additionally, general digital skills applicable in daily and social life play a significant role in current models of digital literacy and technologies (Siddiq et al., 2016).

Nikolopoulou and Gialamas (2015) investigated which technology-centric teaching methods teachers find more useful and analyzed the role of teachers in using information and communication technologies in education. However, teachers face challenges in integrating digital technologies into art education methods in the classroom. While educators, especially young teachers, are more exposed to digital technologies and use them in their personal lives, the purposeful use of these technologies for educational purposes appears to be somewhat more complex. Although teachers are familiar with technological capabilities, their competencies and skills in using these technologies are limited (Valtonen et al., 2011). Given recent digital changes worldwide, the importance of this issue has increased, and educational institutions are more engaged in this field, as there is a need for teacher training to prepare them for integrating digital technologies in education (COL, 2020). However, there is still a long way to go for fully integrating digital technologies into educational courses.

Teachers who previously taught in technology-free classrooms are often identified as a group with the greatest need for technology training. However, contrary to popular belief, belonging to a generation that has grown up as digital natives does not automatically provide teachers with the instructional skills for using educational technology. In a study, they reported a lack of readiness to use technology in the classroom, and their teacher preparation program lacked sufficient training on how to teach with technology (Simpson, 2023)

As revealed by the research findings, some of the main challenges in integrating digital technologies into education include a lack of time for learning new technologies, insufficient teacher training, and the need to assess technology-centric teaching methods. Given these

issues, training courses are undeniably essential to educate teachers on the effective use of digital technologies in art education. Since technology plays an increasingly prominent role in our daily lives, incorporating these advancements into the educational landscape is crucial for fostering innovative and engaging learning experiences. In the realm of art education, where creativity and expression take center stage, teachers must equip themselves with the skills and knowledge to effectively utilize digital tools. These training courses serve as a bridge between traditional teaching methods and the evolving landscape of technology, empowering educators to harness the full potential of digital resources. By providing necessary training to teachers, these courses enhance their proficiency in using digital technologies and guide students toward a more skillful and creative learning journey. The necessity for such courses becomes evident as they contribute to the evolution and overall improvement of art education in the age of digital advancement. When teachers acquire expertise and enjoy the process, the entire educational community benefits from these skills and successes.

The Importance of Teacher Training and Professional Development Courses

Teacher training and professional development courses are crucial in using digital technologies to develop teaching methods and improve the quality of art education. Among the critical reasons for training teachers and preparing them for the integration of digital technologies in art education, the following points can be highlighted:

The need to keep up with rapidly evolving technology can lead to job burnout and teacher stress. Improving teachers' skills in using digital technologies can enhance their mental and emotional well-being.

Teachers, as learners, require attention and care similar to students. The need for security serves as a foundation for acquiring new knowledge and skills.

Continuous learning opportunities, regardless of the time spent in the classroom, are essential for teachers to enhance their skills.

Teachers can quickly establish connections with their peers, fostering better learning through group training and collaboration with other educators.

Teachers equipped with the necessary skills and knowledge in the field of digital technologies can provide students with more diverse and engaging learning experiences. By presenting new content and strategies, educational courses enable teachers to familiarize themselves with innovative tools and methods and effectively use them. These courses not only enhance technical skills but also transform educators into more innovative and pioneering thinkers in the field of education. Considering past studies, teacher training occurs through various methods. This study aims to investigate three learning approaches: personal learning, experiential learning, and institutional learning.

Experiential Learning

Teachers can, alongside formal educational processes, observe and analyze other features of technology, such as potential accessibility and innovative capabilities, through life and work experiences (Santos et al., 2016). Another aspect of experiential learning involves testing new digital strategies and technologies that can enhance teachers' education, engagement, and skills. Educators must constantly strive to integrate technologies within the curriculum framework. The readiness of teachers to use digital technologies in the classroom requires an experiential and practical training approach. This method involves teachers' direct experience with various educational tools and technologies. In this regard, educational courses should be designed to allow teachers to become familiar with digital technologies in a practical manner and within simulated environments. These direct experiences allow teachers to experience the necessary skills and techniques for higher efficiency and more effective technology integration in the educational process. Moreover, this approach empowers teachers to practically identify

problems and challenges associated with using technology in the classroom and develop better solutions for integrating these tools into the teaching process.

Personal Learning

Teacher readiness for effective use of digital technologies in the classroom can be enhanced through a focus on personal learning, achieved by voluntarily participating in courses and workshops. This educational approach is based on teachers engaging autonomously and voluntarily in the educational process and familiarizing themselves with new tools and methods using digital educational resources. This instructional method allows teachers to focus on teaching skills and technology-related strategies according to their personal needs and preferences. On the other hand, these teachers will face numerous opportunities for direct and practical experience with digital tools throughout the learning process, increasing their confidence and skills in actively integrating technology into the learning environment. One way to improve teaching skills is to learn from peers with different experiences, expertise, or skills. Teachers can learn a great deal by directly and personally interacting with their colleagues, observing their teaching methods, interactions with students, how they handle challenges, and their problem-solving approaches. Additionally, updating teachers' information and knowledge about lesson content, technology-oriented curriculum, and even global standards are part of the personal education resources for teachers. Although educational institutions also play a significant role in this regard, teachers' personal efforts and motivation in exploring new technologies are highly productive.

Institutional Learning

According to Buabeng-Andoh (2012), contemporary institutions, understanding the impact of new technologies on the learning environment, strive to develop educational curricula in line with innovations and improve their classroom facilities for both students and teachers to bridge the existing gap in technology in education. Furthermore, addressing this issue demonstrates that institutional support is one of the key factors influencing the implementation of technology-enhanced learning. Vannatta and Fordham (2004) stated that teacher trainers and administrators should not only provide extensive training on educational technology but also facilitate the improvement of teaching. Teacher training by educational institutions that have recruited them as their executive force is a fundamental strategy for effectively preparing teachers to utilize digital technologies in the classroom. These institutions are responsible for offering comprehensive and specialized training courses that familiarize teachers with both theoretical and practical aspects of technology integration. Teachers can acquaint themselves with modern tools, methods, and strategies in this process, updating their learning. Additionally, educational institutions can encourage teacher collaboration and idea exchange by providing interactive and collaborative spaces. This approach, besides enhancing skills, promotes flexibility and innovation in teaching.

Methodology

Research design

This research employs a descriptive survey method to investigate the role of teacher training in facilitating the integration of digital technologies in art education. Descriptive methods allow for an accurate depiction of the current situation. Additionally, based on a case study of art teachers in the Department of Art Education and Design at the Abai Kazakh National Pedagogical University in Kazakhstan, the descriptive approach is deemed the most suitable for focusing on the research community and presenting descriptive perspectives. Descriptive methods are among the best approaches for developing tools and examining perspectives that can be useful in the future for devising more effective teaching methods using digital technologies and collecting data for analytical frameworks. This research utilized a questionnaire to obtain more precise information for examining the role of teacher training.

Research population

The research population consists of 25 faculty members (15 women and 10 men) from the Art Education, Graphic Design, and Visual Arts departments at Abai University. Of the participants, six are between the ages of 30 and 40, 5 are between 40 and 50, and 14 are aged 50 and above. The academic ranks of the participants were categorized into three groups: 16 were lecturers, 6 were assistant professors, and 3 were full professors. These faculty members are actively engaged in both theoretical and practical courses in the fields of graphic design, art education, painting, illustration, and music.

Instrument

To achieve the research objectives, a questionnaire was designed to gather detailed information on various teacher training methods in using digital technologies in art education. At the beginning of the questionnaire, it was explained to the teachers that the results of this study would be analyzed solely for research purposes and published anonymously. Participants were asked to provide personal information, including age, gender, education, teaching experience, and other relevant details, to enhance the reliability of their responses. They were also required to sign a written consent form before completing the questionnaire.

The Ethical Committee of the Abai Kazakh National Pedagogical University, Kazakhstan, granted approval for this study on February 24, 2023 (Ref. No. 6) (Appendix 1).

In total, 30 validated questions were developed for the questionnaires, which were distributed online via email and social media to art faculty members. The results were also collected online and organized into Excel tables, followed by SPSS software analysis. The structured questionnaires, designed based on data from previous research, addressed three distinct learning methods: 1) experiential learning, 2) self-directed learning, and 3) learning through organizational training programs. Various aspects were considered when evaluating these learning methods, such as the level of experiential learning in using technologies in art education and whether the participants had experience using digital technologies in their personal lives and classrooms (experiential learning). The participants' effort and motivation for self-directed learning with these technologies and how beneficial they found such learning was also assessed (self-directed learning). Institutional support was evaluated by considering whether the institution provided the necessary resources and support for teachers and classrooms to implement digital technologies, as well as whether the teachers were satisfied with the quantity and quality of the training programs offered by the institution (institutional learning). The first section of the questionnaire collected personal information from the teachers. The second section asked about their experiential, self-directed, and institutional learning levels. The third section examined potential challenges in working with digital technologies. Finally, the questionnaire asked how essential they found training programs for teachers to facilitate the use of digital technologies in art education.

Validity and reliability tests

After assessing content validity, the questionnaire results were collected online and stored on a specialized online survey platform. The collected data were categorized in Excel sheets and analyzed using SPSS software. The reliability of the research was measured separately for each section of the questionnaire using Cronbach's alpha. The data indicated a reliability coefficient of 0.88 for the first section of the questionnaire, which included experiential, self-directed, and institutional learning. Additionally, a separate reliability assessment for the challenges associated with using technology in the second section yielded a coefficient of 0.78.

Research findings

Table 1 Indicators of teachers' learning for the utilization of digital technologies in art education Based on the results of data analysis, as observed in Table 2, the experiential learning

of teachers was measured with an average of 3.6. While they expressed an interest in individual and personal learning using technologies, with an average of 3.7, this learning method had the highest average. In this regard, participants estimated their level of enthusiasm for personal learning to be 3.9, and they also stated that their level of personal learning had been 4.0 so far. Learning through university and educational institutions (meaning the extent to which educational institutions provide learning courses for their teachers) has the lowest average at 3.3. In this domain, participants evaluated the availability of necessary equipment provided by the institution for teaching and learning digital technologies in art classes as 3.2. Additionally, the support and sponsorship of the university for the technology-centric teaching and learning process were measured at 3.3.

Table1

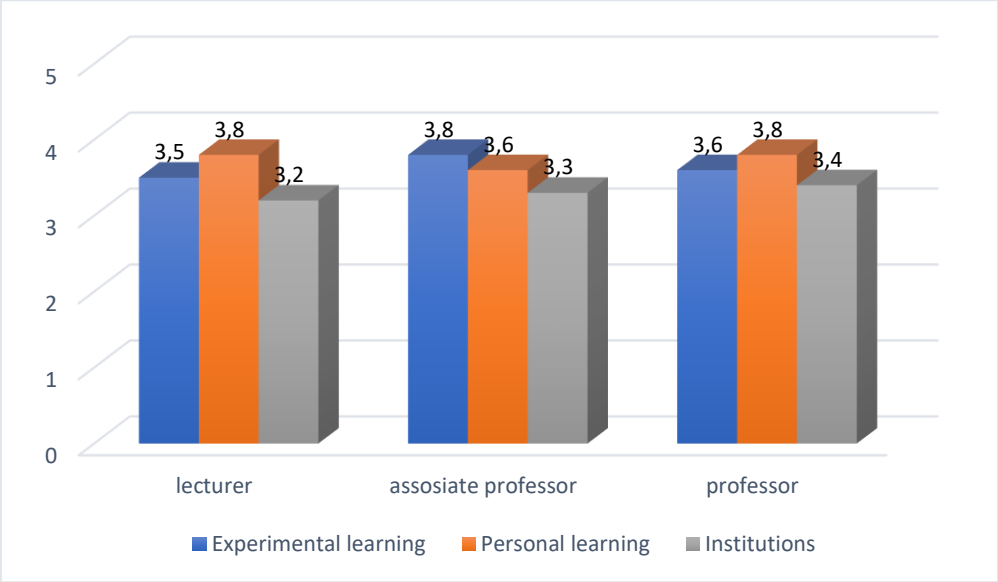
Different approaches to education and training of teachers for the use of digital technologies

Factor	variable	measure	mean	Std. Deviation	Cronbach Alpha
Experiential learning	Experience of using technology in personal life	3.8	3.6	0.66	0.88
	Experience in using technology in the university classroom	3.6		0.64	
	Experiential learning of digital technology application	3.4		0.65	
Personal learning	Efforts to enhance skills personally	3.4	3.7	0.65	
	Level of personal learning	4.0		0.70	
	Level of willingness to learn in person	3.9		0.75	
Learning through institutional training courses	Facilities provided by institutions	3.2	3.3	1.11	
	Courses offered by the institution	3.4		0.82	
	Support and sponsorship from educational institutions	3.3		0.80	

Considering the results in Table 2, a figure was also prepared based on teachers' academic ranks. In Figure 1, the levels of experiential, personal, and institutional learning were measured for each of the three categories of teachers: lecturers, associate professors, and professors. As observed in the figure, teachers with the academic title of associate professor demonstrated the highest level of experiential learning with a score of 3.8. Teachers with the titles of lecturer and professor had the highest learning through personal means. In all three categories of teachers, the lowest average was related to learning through educational institutions.

Figure 1

The amount of teachers' learning indicators based on their academic rank



In the following, to examine the challenges faced by teachers during the technology-centric learning and teaching process, a list of potential challenges was compiled. Subsequently, after summarizing and categorizing this list into three main items, participants were asked in the questionnaire to evaluate the level of challenges they encounter when using digital technologies. In this regard, the level of challenges during the use of digital technology was assessed at 2.6, which was lower compared to other aspects. Additionally, the complexity of using technologies was measured at 3.2, and teachers' skills in solving hardware and software problems were rated at 3.1.

Table 2

Challenges of art teachers when working with digital technologies

variable	measure	mean	Std. Deviation	Cronbach Alpha
Level of difficulties encountered in using digital technologies	2.6	2.9	0.81	0.78
The complexity level of using technologies in art education	3.2		0.57	
Level of familiarity with solving hardware and software problems	3.1		0.68	

Finally, the primary and fundamental question to achieve the research objective was posed to the teachers regarding the necessity of teachers undergoing training courses. In response to this question, Figure 2 has been designed. More than half of the participants have evaluated training courses' importance as very high or high. Participants know the role of introductory training in developing proper methods for applying technology in art education, and they are familiar with their strengths and weaknesses. Therefore, they consider organizing training courses for teachers to be essential.

Figure 2

Evaluation of the necessity of training courses and teacher training by institutions

Table 3

Necessity of training courses and teacher training by institutions According to teachers' academic rank

variable	measure	mean
Lecturer	3.9	4.0
Associate professor	4.1	
professor	4.3	

Discussion

A study conducted by Simpson (2023) explored the fact that even younger teachers from the digital-native generation require training courses. The collected data identified three teacher training methods: experiential learning, self-directed learning, and institutional training. Among these methods, participants across all categories reported lower levels of training through educational institutions compared to experiential and self-directed learning. The results indicate a greater need for institutional training among teachers, revealing a perceived gap in this area. This highlights the importance of including teacher training programs in the use of digital technologies, even for the new generation of teachers. As shown in Figure 1, institutional training was rated at 3.2, the lowest compared to the other methods.

Additionally, a study by Paetsch et al. (2023) demonstrated that teachers who receive support from their institutions and colleagues tend to integrate technology more successfully into their teaching methods, referred to as experiential learning in this research. This trend was particularly evident among teachers with the rank of assistant professor, who reported an average experiential learning score of 3.8, higher than their peers. Meanwhile, teachers with the ranks of lecturer and professor demonstrated higher levels of self-directed learning. As shown in Table 1, self-directed learning was the highest-rated method with an average score of 3.7, experiential learning at 3.6, and institutional learning at 3.3, the lowest of the three

methods. Furthermore, the necessity of training programs provided by institutions was rated at 4.0, emphasizing the crucial role institutions play in supporting digital technology training. Another study objective was to examine teachers' challenges when using digital technologies. Some of the challenges identified included difficulties in implementing the technologies (2.6), the complexity of using these technologies (3.2), and an inability to resolve hardware and software issues related to them (3.1). The overall average for challenges faced by teachers when using digital technologies was 2.9.

While the findings of this study highlight the importance of institutional support in encouraging teachers to use digital technologies, as well as the teachers' needs in this area, education is a multifaceted issue that must be examined from various angles. It is essential to identify and assess other factors that influence this process. Due to the limitations of this study, only academic rank was considered in evaluating teachers' perceptions of training methods and the necessity of using digital technologies in art education. Examining variables such as gender and age could help bridge the gap between digital technologies and teachers' willingness to adopt them.

Conclusions

The primary goal of this research was to identify teacher training methods and their preparation for incorporating digital technologies into art education. Three methods—experiential learning, self-directed learning, and institutional training—were identified, and the second objective involved evaluating teachers' perceptions of these methods. The results revealed that self-directed learning, with an average score of 3.7, was rated higher than experiential and institutional learning. This indicates that teachers are motivated and willing to embrace and integrate digital technologies into art education. However, the lower score for institutional learning highlights the ongoing need for increased support and collaboration from educational institutions in this area. According to the participants, there is a significant demand for training programs to equip teachers with the effective use of digital technologies in art education.

The results from Figure 2 and Table 3 underscore the critical need for well-designed training programs that empower educators to use digital technologies skillfully in art education. Participants rated the necessity of institutional training at 4.0, indicating a high demand. These programs serve as a bridge between traditional teaching methods and the evolving technological landscape, allowing educators to harness the potential of digital resources fully.

The third objective explored the challenges teachers face when using these technologies. Participants rated the complexity of using digital tools at 3.2, while their familiarity with hardware and software issues was rated at 3.1.

The fourth objective examined the role of teachers' academic rank in their views on digital technology adoption and teacher training methods. The findings suggest that assistant professors rated the necessity of institutional training higher than their counterparts, with a score of 4.2.

In conclusion, this study aims to clarify the path of integrating digital technologies into art education, identifying obstacles, and exploring various aspects of this process. The findings can contribute to developing more effective strategies for incorporating digital technologies into art education, offering valuable insights for analyzing organizational and educational frameworks. Moreover, they encourage educational institutions, especially in Kazakhstan, to develop teacher training curricula that focus on the use of digital technologies.

They identify obstacles and explore various aspects of integrating digital technologies into art education. The findings can contribute to developing more effective strategies for incorporating digital technologies into art education, offering valuable insights for analyzing organizational and educational frameworks. Moreover, they encourage educational

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Suggestions and Future Implications

The effective integration of digital technologies into art education relies heavily on strategic recommendations and a forward-thinking approach to teacher training. To advance this integration, it is crucial to design and implement comprehensive teacher training programs explicitly tailored to the nuanced aspects of art education. These programs should surpass basic digital literacy, providing profound insights into diverse digital tools and teaching methodologies. Mentorship programs, where experienced art educators proficient in technology can guide and support their peers, would prove highly beneficial. Moreover, advocating for institutional support in terms of resources and policies is paramount to creating an enabling environment for the seamless integration of digital technologies. Future research efforts should focus on evaluating the impact of digital tools on art education and refining evidence-based training programs.

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Competing Interest declaration

No competing interests declared. The authors have no relevant financial or non-financial interests to disclose.

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DEVELOPMENT OF SELF-MANAGEMENT, TEAMWORK, LEADERSHIP, TIME MANAGEMENT SKILLS THROUGH PROJECT ACTIVITIES

Abstract. The article is devoted to the development of the principles of project activities. In the state compulsory education standard, projects are used as a form of state final certification. Because project activity arouses interest, allows you to develop social skills in the process of group interaction, acquires research experience, and forms skills such as creative thinking. Acquired skills increase the level of motivation of students, allows to increase the initiative of students.

The article analyzes the content of project activities based on documents in the field of education. Pedagogical literature was effectively used in revealing the historical aspects of the project. The effectiveness of applying project activities to students is the development of self-management skills, teamwork, leadership, and time management. The effectiveness of the formation of students' skills through project activities in the study of biological disciplines has been studied. The development of these skills in solving problems that we face in life has a positive effect on their becoming a person.

In improving the quality of education, it is important to form scientific thinking in the process of teaching biology that meets academic requirements and objectively assess a specific scientific problem, determine ways to solve it. Each project action represents a specific situation in which solutions are required using logical analysis. During the experiment, experiments on the formation of cognitive interest, demonstration of biological and other methods were used. During the writing of the scientific article, the results of an experiment on the development of self-management skills, teamwork, leadership, and time management through project activities were summarized.

The authors conducted a comparative analysis of the results of the assessment of students' project skills before and after the completion of the project. It can be concluded that training based on project activities and self-management skills, teamwork, leadership, and time management is in demand today.

Key words: Project activity, self-management, teamwork, leadership, time management skills, project learning, student-oriented, problem-oriented, biology.

Introduction

Science is developing rapidly, therefore it is normal for human skills to develop rapidly. Whether it is a student or a learner, the years spent at university and school undergo great physical and social-emotional changes. These changes have a profound impact on the fact that students are engaged in research projects. The main problem in raising the motivation of students is to guide them to scientific research work. Conceptual education based on comprehensive study of phenomena, including scientific project activities, is currently considered by many developed countries as one of the most progressive methods of modern education. Because directing students to a deeper study of nature strengthens the ability to think creatively and increases the quality of education.

The use of various methods of teaching contributes to increasing and maintaining interest in the subject, research activity through design and action of students to better master the

educational material. Knowledge given correctly by any teacher and consciously received by the learner differs in its depth, strength, and effectiveness. A real teacher should not be a teller of specific knowledge, but a person who shows the way to master that knowledge. In acquiring knowledge - active participation of learners, application of acquired knowledge and skills, as well as further acquisition of knowledge on their own, forms values in the process of living. The scheme of cooperation between the teacher and the learner has become a factor of personality development and self-determination. The effectiveness of using scientific project activities in pedagogical activity is the formation of general educational skills and self-management, teamwork, leadership, and time management skills.

Today, the dynamics of information complexity is exceeding its speed. The transition to an updated curriculum today requires teachers to solve many problems in the field of education. And within the updated program, the school needed the following teaching methods:

1. Formation of students' creativity, active initiative position;
2. Development of research, reflective, self-assessment skills and abilities;
3. Formation of competences related to research service experience;
4. Development of students' cognitive interest;
5. Implementation of the principle of connecting education with life.

Teachers turned to project activities to solve their didactic tasks. The basis of the design activity is the idea that constitutes the meaning of the concept of "project", its pragmatic orientation to the result that can be obtained when solving a certain meaning. To achieve such a result, students should be taught to think independently, find problems and solve them. For this purpose, it is necessary to learn from various fields, to be able to predict outcomes and possible situations. During the analysis of scientific and teaching-methodical literature, we paid attention to the following issue: the use of design technologies shows that teaching biology is a very effective tool in organizing the learning process.

The main task of teaching in a modern school is to improve the quality of education. It is determined that every student is able to discover their potential. According to the research of many scientists, every child is talented. Developing self-management, teamwork, leadership, and time management skills through project activities is an important step. In addition, another issue in biological education is the ability of students to independently acquire knowledge through scientific projects, to be able to apply it in practice, to improve and supplement it. It should be noted that many universities in any field, including pedagogical ones, have the opportunity to conduct projects, but they do not always use their full potential in education. Umirzakova et al. (2020) stated in the article that today, students need to conduct environmental research in the local area where they live, and all conditions are created for it. Conducting research through project activities not only provides accurate information about nature, but also provides an opportunity to form an important personal relationship to nature in general.

Different approaches to project management (traditional, flexible, hybrid) in different contextual contexts (organizational industry, project type, novelty, technology, complexity, and pace) affect project profitability criteria (Ciric Lalic, et al., 2022).

The purpose of the research is to study the effectiveness of self-management, team work, leadership, and time management skills formation for students in the teaching of biological subjects at universities and schools.

To achieve the goal of the research, it is necessary to solve the following tasks:

1) Study and analysis of foreign and domestic pedagogical literature that reveals the historical aspects of the project of students in the teaching of biological subjects at universities and schools;

2) Based on the main documents in the field of education, preparation of the methodological justification of the content of the project activities in the teaching of biological subjects in universities and schools;

3) Conducting an experimental competition of students' courses on project activities in the teaching of the subject "Biology" for 7th graders;

4) Conducting an examination of the educational product and analyzing the results of the pedagogical experiment, describing the motivational and educational effects; Finding ways to solve problems through self-management, teamwork, leadership, and time management skills in project activities;

5) Study of the state of scientific project teaching in the practice of biological education at a higher educational institution and school;

6) Consideration of socio-emotional skills developed in students through scientific projects (Petuhova, 2013).

Mavrina I. (2020) uses project activities in a purposeful, planned manner in modern education. It has been shown that it is a method proven to be necessary for the formation of personal qualities and inclusion of an individual in society.

The main goal of the updated standard is to apply active methods to students. One of the requirements of modern educational standards is to maintain the equality of knowledge and skills and offer reasonable methods. Educational systems are offering modern methods that generally conform to the same state standard structure.

Grekhankina L.F. (2020) showed that project-based learning is seen as an alternative to the traditional classroom system in schools. Projects play an important role in forming a conceptual understanding of the subject "Biology". Develops thinking through scientific project activities of teachers and students in the classroom (work outside the classroom).

Taking into account the conceptual features of the teaching process of "Biology" that can meet the modern requirements for natural science education, it is necessary to take into account both the need to use traditional tools and the introduction of innovations, which affects the quality of independent individuality of learners. Yatheesh (2010) requires maximum independence and creative approach during the implementation of projects. However, a creative project has its own algorithm. First of all, it was emphasized that the formulation of ideas to determine the needs, the setting of requirements for the design object, their analysis, and the planning and preparation of the object. Fulfilling these requirements will develop students' self-management, teamwork, leadership, and time management skills.

The first goal during project activities is to identify emotion in the formation of social-emotional skills.

The main findings in project learning:

1) The student looks for a problem by himself, takes an organizational position. This process develops his creative abilities.

2) The educational process of teaching through project activities is based on the logic of each student's actions, and increases his motivation to study.

3) It is natural to have different approaches to the development of projects, the thought should not be double-edged as a process of influencing the development of the main mental and physiological aspects of the student in only one direction.

4) Convenient, individual performance of project activities carried out in a group can affect the student's level of development. If possible, age characteristics should be taken into account. And students can do projects individually.

5) Teaches how to apply basic knowledge in various life situations.

Terentyeva (2014) believes that the main factor is the stimulation of students' own activities in accordance with the above-mentioned rules of project activities. Self-regulation and self-control of learners play an important role in the selection of tasks during the project,

cooperation, formation of motivations for action, and the implementation of an individualized approach during the acceleration of the process of acquiring knowledge and skills.

Types of research activities in the project:

1. In express research, students conduct research independently and describe and formalize it. For example, observation of birds in their winter nest, observation of the behavior of domestic animals in winter conditions and protection from enemies, etc. Outside of class, scientific research activities include preparation and participation in biology Olympiads, competitions, participation in educational expeditions, ecological cources, creative works, writing essays.

2. During the learning experiment, the projects include laboratory and practical work. Learning experiment is one of the effective methods of learning. Students should be able to perform both laboratory and practical work during projects:

1) It is necessary to look at biological objects under a microscope, to know its technique;

2) To know the methodology of studying the composition of substances found in nature;

3) Being able to study the structure of the body;

4) Being able to observe living objects;

5) To be able to control the processes of life activity of an organism;

6) Study of superorganismic levels of organization of living matter (species and ecosystem).

3. Research competitions.

4. Summer tasks: creating a herbarium and collections from the completed tasks according to the updated program.

The above-mentioned pedagogical conditions contribute to the development of students' research activity skills. During the study, the student uses situations that encourage him to defend his opinion, to provide evidence, arguments, facts, to use methods of gaining knowledge and experience, to ask questions to the teacher and peers, to identify ambiguities, to understand knowledge in a deeper way. Gora (2014) believes that group work during project activities consists of work related to the active search for new information.

In order for the project method to be more productive and successful, it is necessary to know the requirements for it. It is necessary to be able to direct and use it correctly . (Azanbekova, 2022). A prerequisite for success in the implementation of projects is the search, knowledge of scientific problems, research methods. Scientific projects will fail if you do not know the methods of creative activity and cannot conduct statistics and mathematical calculations. Having a good knowledge of data processing skills, students can successfully organize scientific project activities. It's all about the technology of scientific design methods.

Problems of formation of students' cognitive interest are constantly changing nowadays. It is important for everyone in the world to be able to read, because to achieve success in life, you need to learn throughout your life. It is important to teach students to understand the value and meaning of their actions, to feel responsible for them (Grichik, 2014).

Human cognitive activity is a very complex process of interaction of external and internal conditions. External influences are decisive in the formation of a person's cognitive interest, but as a person's consciousness develops, internal conditions: experience, worldview, interests and needs play a major role in fixing the direction of his personality. These factors, in their contradictory unity, form a direction in the actions of an individual, which affects the entire development of psychological processes of a person (Gulenkova, 2018).

In addition, the formation of cognitive interest should be considered as a process related, firstly, to the procedural value of the activity that leads to the formation of cognitive interest, secondly, to the level structure of cognitive interest, and thirdly, to the procedural nature of the learning process, which is an organic part. The process of forming cognitive interest is interest.

On the basis of these theoretical rules, the goal of forming the cognitive interest of students can be clarified through a set of tasks: formation of cognitive interest, development of cognitive independence and research skills.

Taxonomy of goals of formation of students' cognitive interest: level of cognitive interest (reproductive activity); the level of cognitive independence (partly proactive activity); designed to provide the level of research skills (creative activity).

Muluk, S. et al., Conducted in 2021 with the aim of studying the factors that contribute to the success of high-achieving students in academic and public life through project work. The results of this study are expected to provide readers with important insights from the respondents ' experiences that can be used as references in academic or social fields. (Muluk, S. et al., 2021).

Methodology

- Acquaintance with pedagogical documents, review of scientific and methodical magazines;
- Analysis of curriculum for 7-9 grades of "Biology" subject at school;
- Studying the best experience of Kazakh teachers;
- Monitoring students;
- Conversation with students;
- Pedagogical: ethnopedagogical, ethnopsychological, sociometric tables, didactic test questions, control. Conducting surveys, conversations, interviews, questionnaires.

Results and discussion

According to the theoretical rules defining the requirements for the methodological system of teaching biology, the first stage of solving the tasks was aimed at forming the cognitive interest of students, which in turn was implemented step by step. In the course of the experiment, experiments on the formation of cognitive interest, demonstration of biological and other methods were used.

During the experiment, "6B01505-Biology teacher training" conducted project activities on several topics with the students of EP.

In the first phase of the research, it was important to maintain the interest of learners, their constant interest in the subject, the structure of the course, the logic, the search methods used in it, and the proof of new knowledge. Diagnostic tools-questionnaires for 1st-year students and schoolchildren have been developed. Examples of answers to survey questions are shown in Table 1 and described.

Table 1

The survey "Importance of studying biology for students and pupils"

	Ex The group is a student	**Ex The group is a pupil**	**Control group a student**	**Control group pupil**
My attitude towards "Zoology" and "Botany" subjects is positive	31-100%	18-75,0%	26-100%	15-60,0%
I believe that the development of self-management, teamwork, leadership, and time management skills are important for project work.	21-67,7%	15-62,5%	15-57,6%	14-56,0%
The reason why students became more interested in biology classes at school - I expanded my intellectual horizons in biology	22-70,9%	14-58,3%	14-53,8%	15-60,0%

- Could biology be useful in the future?	31-100%	21-87,5%	26-100%	11-44,0%
- What kind of university is it necessary to study biology at school?	20-64,5%	22-91,6%	16-61,5%	12-48,0%
- It is important for me to know the origin and structure of living organisms	19-61,2%	24-100%	12-46,2%	14-56,0%
High assessment of students' knowledge of biology	24-77,4%	21-87,5%	11-42,3%	15-20,0%
Students have an interest in biology outside the school curriculum	22-70,9%	22-91,6%	11-42,3%	11-44,0%
In biology classes, prefer to do laboratory work, test tasks, creative tasks, collective discussion of questions, making reports, as well as going on excursions.	25-80,6%	24-100%	14-53,8%	14-56,0%

As shown in Table 1, after analyzing the questionnaires of 1st-year students and schoolchildren, it is possible to conclude: 100% of students want to participate in "Zoology" and "Botany", 64% of students of the experimental group like biology, and education of the control group only 62% of recipients are not indifferent to biology.

For 70.9% of the students of the experimental group, "Biology broadened my intellectual horizons", 67.7% believe that the development of self-management, team work, leadership, and time management skills are important skills for performing project work; 100% believe that biology can be useful in the future. Studying biology at school is necessary for admission to which university - 64.5%; Why is it important to know the origin and structure of living organisms - 61.2%; Students' assessment of their knowledge in biology - 77.4%; Students' interest in biology outside the school program - 70.9%; Also, in biology classes, they prefer to do laboratory works, test tasks, creative tasks, collective discussion of questions, making reports, as well as going on excursions - 80.6% answered. Most students prefer to do laboratory work, test tasks, creative tasks, collective discussion of questions, make reports, and go on excursions in biology classes.

Many students were interested in biology as a school curriculum. From the obtained results, it can be concluded that students like to study biology, because they learn a lot, study the structure and diversity of plants, make observations in laboratory work, work with a microscope.

In order to determine the level of students' cognitive interest in the study of biology, we used the testing method. According to the results of testing, the summary of the experimental group is shown in Table 2 below. 38.7% of 31 students showed a high level, 45.2% showed an average level, and 16.1% showed a low level. During the experiment, it can be seen that the quality of students' education has changed during the work with projects. The high level changed to 38.7%-51.6%. The average level has decreased from 45.2% to 35.4%. And the low level decreased from 16.1 to 13.0%.

Table 2

Summary table for determining students' cognitive interest (experimental group determination period)

Level	**Before the experiment**		**During the experiment**	
High level	12	38,7%	16	51,6%
Average level	14	45,2%	11	35,4%
Low level	5	16,1 %	4	13,0%

As shown in Table 3 below, the educational levels are shown in the summary table that determines the cognitive interest of the experimental group by pupils.

20.9% of 24 students showed a high level, 58.2% showed an average level, and 20.9% showed a low level. During the experiment, it is possible to see that the quality of students' knowledge has changed during the work with scientific projects. The high level changed from 20.9% to -25.0%. The average level remained unchanged at 58.2%. And the low level - decreased from 20.9 to 16.7%.

Table 3

Summary table determining pupils' cognitive interest (experimental group identification period)

Level	Before the experiment		During the experiment	
High level	5	20,9%	6	25,0%
Average level	14	58,3%	14	58,3%
Low level	5	20,9%	4	16,7%

Based on the results of the testing, a summary table 4 of the control group consisting of students was created. 19.2% of 26 students showed a high level, 53.8% showed an average level, and 27.0% showed a low level. It can be seen that the quality of students' education has changed during the experiment. The high level remained unchanged at 19.2%. The average level has changed from 53.8% to 57.7%. And the low level - decreased from 27.0% to 23.1%.

Table 4

Summary table determining students' cognitive interest (control group determination period)

Level	Before the experiment		During the experiment	
High level	5	19,2%	5	19,2%
Average level	14	53,8%	15	57,7%
Low level	7	27,0%	6	23,1%

The summary of the control group consisting of students according to the test results is shown in Table 5. 28.0% of 25 students showed a high level, 52.0% showed an average level, and 20.0% showed a low level. It can be seen that the quality of students' education has changed during the experiment. The high level is down from 28.0% to 24.0%. We included in the plan the need to determine the cause. The average level has changed from 52.0% to 60%. And the low level – decreased from 20.0% to 16.0%.

Table 5

Summary table determining students' cognitive interest (control group determination period)

Level	Before the experiment		During the experiment	
High level	7	28,0%	6	24,0%
Average level	13	52,0%	15	60,0%
Low level	5	20,0 %	4	16,0%

Many possibilities of biology as a subject, variety of relevant topics, high level of integration with other sciences, various forms of organization of extracurricular activities in biology are perfectly combined with the use of scientific design technologies to implement the requirements of FGOS. The school course of biology provides wide opportunities for various and scientific project activities. Each section of the biology course can be divided into topics for the use of research projects.

The first level of formation of cognitive interests depends on the content of knowledge, interesting facts, and the study of real phenomena. Creative activity is reflected in the desire to perform planned tasks. This simple level of formation of cognitive interest is characteristic of students whose emotional component of cognitive interests dominates, and the pedagogical effect at this age consists mainly of forming a positive emotional relationship to the content of knowledge and the learning process.

The second level of the development of cognitive interests is characteristic of students who have begun to develop a cognitive interest in establishing cause-and-effect relationships, in knowing the important properties of objects and phenomena. The level of creative activity is reflected in the desire to reveal the essence of the studied processes and phenomena; the intellectual component of cognitive interests begins to prevail over the emotional. The scientific project plays a big role in students' ability to independently study biological processes and phenomena, solve problems, uncover problems, and form the essence of the studied concepts. This process is associated with the complexity of descriptive and investigative nature of activity.

Project activity is the interaction of students with each other and with the teacher.

Empirical basis of the research: 1st-year students of Abay Kazakh National Pedagogical University and schoolchildren of Almaty city were selected to conduct a pedagogical experiment. The number of students included in the experiment is 57. 31 students were included in the experimental group, consisting of 1st-year students studying "Botany", Zoology" courses, and 26 students were included in the control group. The experimental study was conducted in the 2nd year. 24 students from the 9th grade A, 25 students from the 9th grade B participated.

Research organization and stages:

In the first stage, an analysis of normative documents, pedagogical, psychological and methodological literature on the issue of project activities in teaching biological subjects at universities and schools was carried out; research topic, goal, objectives and methodology were formulated.

In the second stage, practical and experimental work was carried out on testing the educational course, the results of the pilot experiment were analyzed, the thematic program, the methodological and resource base of the scientific project were specified, and the methodology of the formative experiment was developed.

In the third stage, a formative experiment was conducted, quantitative and qualitative analysis of experimental data was conducted, data were collected, conclusions were formulated, and a thesis was formalized.

As one of the educational factors, the formative experiment on the formation of skills during project activities consists of 2 stages.

In the course of pedagogical practice held at the Abay Kazakh National Pedagogical University, students were divided into two groups: the experimental group (31 students) participated in the project work, and the second group (26 students) participated as a control group. During the experiment, "6B01505 – Biology teacher training" conducted project activity activities on several topics with the students of EP.

After analyzing the questionnaires of 1st-year students and schoolchildren, it is possible to conclude: 100% of students want to participate in "Zoology" and "Botany", 64% of students of the experimental group like biology, and only 62% of students of the control group - is not indifferent to biology.

For 70.9% of the students of the experimental group, "Biology broadened my intellectual horizon", 100% believe that the subject of biology can be useful in the future. Studying biology at school is necessary for admission to which university – 64.5%; Why is it important to know the origin and structure of living organisms – 61.2%; Students' assessment of their knowledge

in biology – 77.4%; Students' interest in biology outside the school program – 70.9%; Also, in biology classes, they prefer to do laboratory works, test tasks, creative tasks, collective discussion of questions, making reports, as well as going on excursions – 80.6% answered. Most students prefer to do laboratory work, test tasks, creative tasks, collective discussion of questions, make reports, and go on excursions in biology classes.

To sum up, a portrait of a versatile person who has a creative inclination and can master a scientific profession, feels responsible and brings everything to the end has emerged. In general, being a person who can manage several things at the same time, there is a chance to become a scientific methodologist or a creative person.

Conclusion

According to the results of the research, the project activity method is one of the leading methods in the educational process. The state educational standard of general education envisages the use of research projects as a type of state final certification. Organizes scientific project methods as the final work of students in higher educational institutions. Curiosity, in the process of group interaction, allows to develop social skills, to gain experience in research activities, to form skills such as creativity of thinking. Based on the above, we believe that the use of scientific project technologies in the educational process allows to increase the level of motivation and efficiency, independence and initiative of students.

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THE ROLE OF SCIENTIFIC AND TECHNICAL DISCOURSE IN THE IMPLEMENTATION OF SCIENTIFIC LANGUAGE TRAINING OF ENGINEERS

Abstract: In this article the content analysis of the concept “scientific and technical discourse” is carried out and various aspects of this concept are systematized. Based on foreign and domestic practices, the main components that characterize scientific and technical discourse as a separate category have been revealed. The key characteristics and properties of scientific and technical discourse are identified, the knowledge and use of which will ensure successful communication in the scientific and technical environment. The specific influence of the identified characteristics on the effectiveness of scientific training has been clarified, since their correct use can significantly increase the quality of language education and training of technical specialists as a whole, improve their professional knowledge and language skills, as well as make them more competitive in the labor market.

This scientific work is the result of research obtained in the process of project implementation “Intensification of scientific and professional language training of technical specialists in the context of digital transformation of education” (IRN AP19678460) by the grant funding of Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan.

Keywords: scientific and technical discourse, characteristics of scientific and technical discourse, scientific and linguistic training, technical specialists.

Introduction

The President Kassym-Jomart Tokayev highlighted technical education and vocational training as critical components of Kazakhstan's future workforce development. The President emphasized the need for educational institutions to align with labor market demands, particularly in technical fields, as part of the country's broader economic strategy (Tokayev, 2024). The demand of the technical language is becoming an urgent task of engineering education. This study examines the role of scientific and technical discourse in improving the scientific language education of engineers. As engineering increasingly relies on accurate scientific communication, understanding this discourse is critical for effective professional development. This study aims to explore the specific characteristics and roles of scientific and technical discourse, thereby contributing to the improvement of language training technical specialists in an evolving digital education landscape.

The appeal to discourse is not new; it is associated with its depth in different spectrums of education. There are different types of discourse: linguistic, foreign language, scientific and technical, medical, etc. In our study we are talking about scientific and technical discourse, in which technical and scientific information is dominant. Many scientists expressed different points of view in defining the concept and features of scientific and technical discourse. However, research conducted in this direction does not fully meet the requirements for the concept of scientific and technical discourse. Problems associated with the analysis of the characteristics of scientific and technical discourse of engineering communication represent a vast field of activity for researchers. The problem actualized in this study, which involves finding an answer to the question of what key aspects characterize scientific and technical discourse of communication in engineering fields, becomes obvious. The objective of the

research is with the great variety of characteristics of scientific and technical discourse too identify exactly those aspects that have an impact on the scientific language training of technical specialists.

The novelty of our research lies in the identification and analysis of the key properties and characteristics of scientific and technical discourse of engineering communication, its role in the scientific language training of technical specialists.

Materials and methods

To conduct the research, a combination of the following methods was used: 1) content analysis to examine the concept "scientific and technical discourse"; 2) practices analysis reviewing both the domestic and international practices related to the problem of the research; 4) interpretation and categorization generalizing the characteristics of scientific and technical discourse.

Within the framework of this methodology, the study aims to find out how scientific and technical discourse plays an important role in the teaching of scientific language for engineers. Through a comprehensive analysis of relevant domestic and international literature, the study focused on explicit consideration of the characteristics of scientific and technical discourse. Source selection criteria included relevance to scientific language education, relevance of publications, and journal authority. Interpretation involves linking the analyzed characteristics of scientific and technical discourse to their role in effective communication.

The study emphasizes the importance of specific language features of scientific and technical discourse, such as specialized language and academic citation, in enhancing communication skills among engineers. The impact of the identified discourse features on improving the quality of language education of engineering professionals is interpreted. Understanding and applying these features can improve communication skills, make engineers more competitive and enhance their overall proficiency.

Categorizing the findings from the analysis, the study identified and generalized the key characteristics of scientific and technical discourse that impact engineering language education. Specifically, features like specialized language, academic citation, and data visualization enhance communication skills and improve technical professionals' competitiveness in the market place.

Results and discussion

The importance of scientific information in modern society is great. It is conditioned by the pace of scientific thought development, its growing influence on all aspects of human activity. Therefore, interest in the problem of scientific and technical discourse remains high.

There is no universal definition of the term *"scientific and technical discourse"* in science, since discourses satisfy different conceptual needs. In this regard, the processes of its definition and assimilation, as well as its use in practice, are complicated. The need for this work becomes obvious, since during scientific training it is important to summarize the material available in modern science about scientific and technical discourse and, to a certain extent, adapt the process of studying and recognizing scientific discourse for technical specialists.

Let us turn to the works of foreign scientists. Representatives of the French school formed different ideas about discourse. The works of M. Pecheux and P. Serio play an important role. According to Pecheux (1975), "discourse is the point where language and ideology meet". Pecheux, M. (1975). Serio (2001) defines discourse as the speech appropriated by the speaker and believes that "discourse is an utterance considered from the point of view of the discursive mechanism that controls it. Fuko (1996) defined discourse as "a set of speech acts united by one problematization". Thus, Habermas (2001) considers the concept of discourse

interdisciplinary. The described concepts of discourse and the directions developed on their basis allow to get closer to understanding discourse in the professional communication of engineers due to their dynamic development, determined by the rapid development of technology, and also begins to attract attention of linguists (Kurkan et al., 2020).

We suppose that scientific discourse is a special form of communication, characterized by the use of special language, logical structure, desire for objectivity and accuracy, orientation toward academic research and discussion of scientific topics. It is a way for scientists to exchange opinions, present research results, confirm conclusions, and discuss various aspects of scientific problems.

Scientific discourse is a type of institutionally oriented discourse, the purpose of which is the process of acquiring new knowledge about the world around us, presented in linguistic form and conditioned by the communicative norms of scientific communication, the participants of which are scientific researchers, the method of implementation is scientific dialogue, the values are key concepts of truth, knowledge and research (Dmitrichenkova & Dolzhich, 2017).

In contrast to the general concept of discourse, scientific and technical discourse is characterized by certain ways of organizing, selecting and using linguistic units, which makes it possible to transmit scientific and technical information effectively. In other words, a certain use of the language of science initiates the implementation of linguistic phenomena characteristic of a given discourse, that is, a specific grammar and corresponding vocabulary. Discourse is formed depending on academic goals; some discursive strategies can be individual (Sandoval, et al., 1999). Let's consider the key characteristics of scientific and technical discourse (Table 1):

- features of scientific and technical terminology;
- visualization and visibility of scientific and technical discourse;
- features of scientific and technical text;
- scientific data analysis;
- design and modeling of technological processes;
- collection and analysis of scientific and technical information;
- academic citation.

Table 1

Key characteristics of scientific and technical discourse

	Scientific and technical discourse	
No	**Characteristics**	**Distinctive features**
1	Scientific and technical terminology	accuracy, brevity, consistency; neutrality, clarity, unambiguity
2	Visualization and visibility of scientific and technical discourse	flow charts, graphs, diagrams, mental maps
3	Scientific and technical text	structuring, clear logic, accuracy, clarity, large number of terms
4	Scientific data analysis	transforming, cleaning, interpreting and modeling data
5	Design and modeling of technological processes	developing plans, concepts for creation of new products, systems, or technologies
6	Collection and analysis of scientific and technical information	process of studying the assessment and interpretation of data
7	Academic citation	assessment of the significance and contribution of individual scientific articles, authors, journals, research groups

Technical discourse as a practice is ahead of theory, since its practical aspects are more accessible and efficient, and the processes are more dynamic (Rubannikova, 2023).

Features of scientific and technical terminology (accuracy, brevity, consistency; emotionally expressive neutrality, absence of synonyms and homonyms, clarity, unambiguity, presence of professionalism, transition of terms into professional slang). Scientific and technical terminology differs from ordinary speech in its accuracy, structuring and specificity. Let's consider the features of scientific and technical terminology:

- precision and exactness: terms must be defined so that their meanings are unambiguous and do not leave room for different interpretations;
- structuring: terms are organized into a system where they can be classified according to various criteria and related to each other;
- uniqueness: each term represents a specific notion or concept, and it is unique within a given field of knowledge;
- derivative forms: in scientific terminology, derivative forms of words are often used to denote different aspects of a concept. For example, a noun can be converted into a verb, adjective, or adverb to describe various properties or actions;
- use of specific concepts: some terms may have a specific meaning within a particular scientific field, which may differ from their generally accepted meaning;
- internationalisms and Latin terms: many scientific fields use terms originating from Latin or Greek languages, as well as international terms, to provide universal vocabulary regardless of language;
- acronyms and abbreviations: in some cases, abbreviations or acronyms are used to denote complex or long terms;
- evolution and updating: terminology of science and technology is constantly evolving and updating in accordance with new discoveries and technological advances.

These features make scientific and technical terminology an important tool for accurate communication and knowledge transfer in scientific and technical fields. The listed parameters allow to consider scientific and technical discourse as a separate type of professional discourse (Kurkan et al., 2020).

Visualization or visibility of scientific and technical discourse - graphic and digital representation of scientific and technical information. Logical visualizations: flow charts, graphs, diagrams, mental maps. Mixed visualizations: infographics, visual notes.

The reason for using visualization in science is the increasing amount of data (Iļjinska & Smirnova, 2014).

Visualization of scientific and technical discourse can be carried out in various ways depending on the goals of the analysis and the available data.

Some approaches for visualization of scientific and technical discourse are: network analysis, topic modeling, term map, frequency analysis, timing charts, graphs and diagrams.

These approaches can be combined or adapted in accordance with the specific goals and characteristics of the scientific and technical discourse being analyzed.

Didactic requirements for modern visual (graphic) materials: reliability, authenticity, information richness, educational relevance, clarity.

Features of scientific and technical text: structuring, clear logic, accuracy, clarity, great richness of terms.

The corpus of scientific and technical text differs from ordinary text in its specificity and features, which ensure its clarity, accuracy and understandability for the target audience.

Here are some features of a scientific and technical text:

- accuracy and clarity;
- objectivity;
- structuring;

- use of terminology and specialized language;
- presenting data in the form of tables, graphs, charts and other illustrations to clearly present results and conclusions;
- extensive use of citations and references to support statements, justify conclusions and point to previous research;
- formal style and vocabulary characteristic of the academic and scientific environment;
- compliance with standards and conventions for data presentation, text formatting, design of tables and graphs, etc.

Scientific and technical text as a communicative value is not limited to the language component (Dmitrichenkova & Dolzhich, 2017). It is believed that the corpus of scientific and technical texts significantly expands research potential (Butenko, 2022).

The highlighted features make scientific and technical text an effective tool for transmitting information and research results in the scientific and technical community.

Scientific data analysis is of particular importance and research interest - the process of transforming, cleaning, interpreting and modeling data to extract useful information, identify patterns, detect trends and make informed decisions. Scientific data analysis includes collecting necessary data from various sources, data cleaning, preliminary analysis, feature extraction, application of analysis methods, interpretation of results, visualization and presentation, decision making. Scientific data analysis is conditioned by the possibility of creating scientific services - a set of processes and resources for servicing research and applied projects by providing the consumer (researchers, specialists) with the products of intellectual scientific activity (Suchkov, 2020).

Therefore, it can be confidently stated that the listed factors form a general process of data analysis, which can be adapted depending on the specific requirements and characteristics of the research.

Design and modeling of technological processes represent not only ways to create scientific and technical discourse, but also tools for the development and knowledge transmission in scientific and engineering fields.

Design involves developing plans, concepts, and specifications to create new products, systems, or technologies. In modern scientific and technical discourse, design plays a key role in the innovation process, contributing to the development of new technologies and scientific discoveries.

Modeling is used to abstract real-life phenomena and create formalized models that can be explored and analyzed; to clarify the understanding of complex systems, identify relationships and understand their dynamics; to formulate hypotheses, test theories, and predict experimental results.

In modern scientific and technical discourse, simulation is widely used to test hypotheses, evaluate the efficiency of processes and predict the behavior of complex systems; it provides the opportunity to simulate the operation of real systems in a virtual environment, which allows experiments to be carried out under controlled conditions.

Design engineering is the process of creating real objects, devices or systems based on theoretical and practical knowledge. In scientific and technical discourse, design plays an important role in the creation of new technologies, devices and tools for research and applied purposes (Perez-Llantada, 2024).

All of these processes interact with each other, creating a cycle of iterations in which the results of one stage can be used as input to the next stage. This approach stimulates the development of scientific and technical discourse, promoting the growth of knowledge and innovation.

Collection and analysis of scientific and technical information - important stages in the research and development process in scientific and engineering fields. In the process of

collecting scientific and technical information, it is necessary to determine the purposes of collecting information and the requirements for it in order to know exactly what information needs to be collected; correctly organize and carry out analysis of scientific and technical information; develop knowledge and practical skills necessary for processing and analyzing information; identify sources of scientific and technical information (scientific articles, journals, books, reports, conferences, Internet, databases, etc.); carry out a systematic search for information in selected sources using keywords, phrases and terms; evaluate the quality and reliability of the collected information, taking into account the authority of the sources, the relevance of the data, the scientific reputation of the authors, etc.; organize the storage of collected information using structured storage methods, such as databases, abstract cards, electronic notes, etc.

Scientific and technical information analysis is the process of studying the assessment and interpretation of data obtained from various sources in scientific and technical fields. This process may be aimed at identifying patterns, trends, new ideas or problems, and making recommendations for the development of further research or practical solutions. Digital communication encourages critical thinking (Rubannikova, 2023).

These steps help ensure an efficient and systematic process for collecting and analyzing scientific and technical information that can be used to support research, development, and decision making in scientific and engineering fields.

Academic citation – an important characteristic of scientific and technical discourse, reflecting the level of influence of the work on the scientific community. In the context of scientific and technical discourse, academic citations are often used to evaluate the significance and contribution of individual scientific articles, authors, journals, research groups, etc. Here are some key aspects related to academic citations:

- Citation Index, such as Hirsch Index (h-index), Gard Citation Index, etc., is used to assess academic citations. It reflects the number of articles and the number of citations to those articles. For example, the h-index is equal to h if the author has h articles, each of which has been cited at least h times;

- Citation in publications. How often an article or research is cited by other researchers in their own work may indicate how significant the results of that work are considered to be by the scientific community;

- Journal Impact Factor is a measure of a journal's citation rate, calculated on the basis of the average number of citations to articles published in that journal over a certain period of time. The higher the impact factor of a journal, the greater its influence and prestige in the scientific community;

- in scientific and technical discourse, it is also important to take into account citations not only in scientific articles, but also in patents, technical reports, conference reports and other scientific and technical documents;

- network analysis of citations allows to study the relationships between various scientific works and research groups, identify scientific directions and key players in a certain field.

Academic citations are an important tool for assessing scientific contribution and influence in the scientific community, however it is important to remember that it is not the only or comprehensive criterion for assessing scientific discourse, other factors can also be important in assessing the quality of scientific work.

Thus, scientific and technical discourse is characterized by these seven characteristics, which facilitate effective communication within the scientific and engineering communities. The dynamic nature of this discourse is driven by continuous evolution and adaptation to new discoveries, necessitating the use of visualizations and data analysis to manage the increasing complexity of information. Key features such as accuracy, clarity, and the systematic

organization of terms contribute to the uniqueness of scientific texts, making them vital for knowledge transfer and research dissemination.

Moreover, the design and modeling of technological processes play a crucial role in fostering innovation, allowing for the simulation and testing of hypotheses in controlled environments. The systematic collection and analysis of scientific information are essential for identifying trends and making informed decisions, while academic citations serve as a benchmark for evaluating the impact and relevance of research within the scientific community. Overall, the interplay of these elements promotes a robust framework for advancing knowledge and driving progress in scientific and technical fields.

It should be noted that the study of scientific and technical discourse within the framework of teaching the scientific language to engineers may face a number of potential problems and limitations. First, scientific and technical discourse is saturated with specialized terminology, which is often incomprehensible to non-specialists. This creates a barrier to analyzing and interpreting texts. For example, terms may have a narrowly focused meaning in one context and be used differently in another. Second, scientific fields may have their own rules, methods, and language, making it difficult to compare and unify discourses between them. For example, physics and biology use different approaches to data presentation and conclusions, making it difficult to analyze them in a unified context. Third, scientific language can change over time. New discoveries, technologies, and research lead to updated and refined terms, which creates the challenge of analyzing scientific texts in their historical development. For example, what was considered an axiom 50 years ago may be disproved today. In addition, scientific and technical discourse often uses formalized language such as mathematical equations, graphs, and tables. This creates difficulties for textual analysis as it requires not only linguistic skills but also specialized knowledge in the field. Thus, all the above-mentioned problems and limitations bring their own specificity to the process of studying the role of scientific and technical discourse.

Conclusions

The study showed that scientific and technical discourse has integrity, logic, consistency, and is a synthesis of communicative, cognitive and linguistic means that structure and actualize the scientific and technical field of activity.

The identified and described characteristics of scientific and technical discourse represent a special type of communication, which is characterized by the use of specialized language focused on the transmission and discussion of scientific information and technical concepts. Using the characteristics of scientific and technical discourse in scientific language training technical specialists provides a deeper understanding of the subject, develops critical thinking, improves problem-solving skills and preparation for working with modern technologies, develops research skills. Thus, the characteristics of scientific and technical discourse help future engineers not only structure their knowledge, make it more accessible to other specialists, but also develop important skills and competencies, and successfully adapt to the requirements of their professional activities.

Here are some recommendations for enhancing the teaching of scientific language for engineers:

1. Integration of scientific and technical discourse in the curriculum: Scientific and technical discourse should be integrated into the curriculum to help students understand specialized terminology and visual data representation. This integration creates a unique "mental environment" that influences how researchers perceive and interpret data, conduct research, and communicate with each other.

2. Practical exercises in analyzing scientific texts: Engage students in practical exercises that involve analyzing real-world scientific texts and creating structured technical documents.

This will enhance students' language proficiency and help them apply theoretical knowledge in practical contexts.

3. Use of digital tools for discourse analysis: Promote the use of digital tools for discourse analysis to ensure that future engineers are well-versed in the communication tools they will encounter in their professional environments. Digital tools can facilitate the analysis of scientific and technical discourse more efficiently.

4. Focus on interdisciplinary approach: Emphasize an interdisciplinary approach to teaching scientific language to engineers. This approach will help students understand the interconnectedness of various fields of science and technology, improving their overall comprehension and problem-solving skills.

5. Teaching critical thinking: Develop students' critical thinking skills by engaging them in activities that require the analysis and interpretation of scientific information. Encourage students to evaluate data, identify patterns, and critically evaluate the results of experiments.

6. Development of scientific literacy: Focus on developing students' scientific literacy by teaching them how to read, interpret, and communicate scientific information effectively. This includes understanding scientific terminology, data visualization, and academic citation practices.

7. Emphasis on specialized terminology: Ensure that students have a thorough understanding of specialized scientific and technical terminology. This will help them accurately communicate and transfer knowledge within their field of study.

8. Use of modern tools and software: Incorporate the use of modern tools and data analysis software in teaching scientific language to engineers. This will familiarize students with industry-standard tools and practices used in scientific research and communication.

9. Promote research skills: Develop students' research skills by involving them in the process of writing scientific articles, preparing technical reports, and analyzing scientific information. This hands-on experience will enhance their research capabilities and prepare them for future professional activities.

10. Encourage adaptation to new discoveries: Teach students how to adapt to new discoveries and advancements in science and technology by discussing how scientific language evolves over time. Help students understand the importance of staying updated with the latest terminology and trends in their field.

By implementing these recommendations, educators can effectively enhance the teaching of scientific language for engineers, enabling them to become proficient communicators, critical thinkers, and competitive professionals in the modern digital education landscape.

In order to develop an effective methodology for studying the role of scientific and technical discourse in the scientific language training process, the following aspects are worth paying attention to: emphasis on interdisciplinary approach, teaching critical thinking, developing scientific literacy, emphasis on specialized terminology, use of modern tools such as data analysis programs, specialized scientific platforms. These recommendations will allow future engineers to develop a deeper understanding of scientific and technical discourse during scientific and linguistic training, and future research can focus on the application of scientific and technical discourse in other specialized fields such as medical or legal engineering. Thus, this research can evaluate how integrating such discourse into the curriculum affects long-term professional development.

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RISK MANAGEMENT IN HIGHER EDUCATION INSTITUTIONS: EXISTING RESEARCH FRONTIERS AND THEIR APPLIED EXTRAPOLATION

Abstract: This article focuses on the analysis of published research on risk management in higher education institutions. The authors believe that for effective implementation of risk management in Kazakhstani universities and the development of a concept for its scientific and methodological support, a systematic and large-scale research effort is necessary. This includes identifying the categorical framework of risk management in higher education. In this context, the authors conducted a bibliometric analysis using the Scopus database, as well as the methodological approach and capabilities of the VOSviewer software tool. The study of sources on the issue of risk management in universities revealed insufficient development of this topic from methodological positions and in the applied context. Additionally, the bibliometric analysis not only identified and visualized current research directions in this field but also highlighted trends for future research in the subject areas of "risk management," "university management," and "risk management in higher education institutions."

Keywords: risk management, university management, higher education, risk management in higher education, quality assurance, bibliometric analysis.

Introduction

One of the key directions in the modernization of the higher education system is ensuring the autonomy and sustainable development of universities, considering the following specific factors of the modern educational sphere. First, the characteristics of educational services (including in the higher education system) as mixed public goods with high social significance, the multifaceted nature of their positive external effects, determining the need for both state participation in their provision and market-private mechanisms for their production (Samuilson, 1964; Masgrave & Masgrave, 2009; Drucker, 1999; Stiglitz, 1997; Zhiltsov, 1995). Second, the transformation of the higher education sector as a system for reproducing intellectual capital and as a key component of the "knowledge economy" (Deming, 2006; Makarov & Kleiner, 2007; Stepanova & Manokhina, 2008; Webster, 2004; OECD, 2011; Glukhov et al., 2003; Tishina, 2012; Lukichev, 2007) with a model of "lifelong learning" (Education Throughout Life, 2019; Resolution of the Government of the Republic of Kazakhstan, 2021; Bochkov, 2004) and an innovative spiral of "education – research – innovative production" (Avdeev & Peshina, 2014; Smorodinskaya, 2011; Leydesdorff, 2012; Lundvall, 1992; Bondarenko et al., 2018). Third, the multiplicity of stakeholders in the educational process (such as customers – students, their parents, government agencies, representatives of the business sector as employers; direct consumers – students; providers – educational institutions) with specific subjective characteristics, motivational determinants, behavioral models, and divergent interests, complicating the process of providing educational

services, including in terms of determining the clear goals, development trajectories, and financial needs of universities.

The mass nature of modern higher education, forming the ability to acquire new knowledge, increasing the requirements for the rapid renewal of this knowledge, strengthening the requirements for the practice-oriented nature of educational programs and their focus on professional standards, the need for active commercialization of the results of scientific activities in close connection with the business sector of the economy, urgently require the strengthening of the organizational culture of universities, also necessitating the implementation of new methods and tools for risk-oriented university management (Filimonova, 2018; Demenenko et al., 2018).

Establishing an effective risk management system in a university is a crucial aspect of its work, as it contributes to the realization of the strategy of sustainable, dynamic, and progressive development of the university, achieving high standards of the scientific and educational process, improving academic policy, organizational culture, and ultimately – enhancing its customer orientation, competitiveness, reputation, and prestige.

An effective university risk management system implies the presence of a multi-functional system of socio-economic communications between all internal and external stakeholders of the university, where students, after completing their studies, maintain constant contact and interaction with the institution, contributing to its innovative growth, knowledge scaling, strengthening the university's prestige, and its competitiveness in the educational services market.

At the same time, despite the intensification of research in the field of risk management in domestic higher education, as well as the developing practice of forming mechanisms and elements of risk management in Kazakhstani universities, it should be concluded that the state of this issue is far from reaching institutional maturity. Therefore, for the effective implementation of risk management in Kazakhstani universities and the development of a concept for its scientific and methodological support, systematic and large-scale research work is necessary, including identifying the categorical framework of risk management in higher education based on bibliometric analysis of published research.

Methods and organization of the study

The design of this study, including the methods and procedures used, involves a bibliometric analysis of published research on risk management in higher education institutions (using the Scopus database), utilizing the methodological approach and capabilities of the VOSviewer software tool (Van Eck & Waltman, 2010; Van Eck et al., 2010). Bibliometric analysis was conducted based on the Scopus database, one of the most well-known and authoritative collections of bibliographic and abstract scientific materials in the world. This database provides extensive search capabilities, user-friendly search and analytical tools, global thematic coverage with daily updated information, and a rigorous methodological approach to ensure the quality of published articles.

The research methodology includes the following stages:

1. Formation of a sample of published scientific works in the Scopus database on the following research frontiers: "risk management," "university management," and "risk management in higher education institutions;"

2. Identification of publication dynamics on risk management issues in higher education institutions in the Scopus database from 1987 to 2024;

3. Construction of a scientific map of thematic clusters based on the keywords used in existing studies on risk management in higher education institutions, identifying the network of connections between the studied terms and their genesis;

4. Evaluation of the analysis results, identifying the most important scientific trends and

directions in this research area.

Results

1. Formation of a sample of published scientific works in the Scopus database on the following research frontiers: "risk management," "university management," and "risk management in higher education institutions."

At this initial stage of the study, we identified published works in the Scopus database in the following subject areas: "risk management," "university management," and "risk management in higher education institutions."

The analysis showed that in the Scopus database for the period from 1990 to 2023:

- There were 4,899,901 publications on management issues, including 1,760 on university management, or 0.04% of all management works.
- There were 150,093 publications on risk management issues, including 44 on risk management in higher education institutions, or 0.03% of all works on risk management.

These indicators suggest that the research space on university management issues in general, and particularly on the implementation of risk management in higher education institutions, is currently narrow and underexplored, with a lack of reliable and substantiated primary sources. Therefore, research in this underexplored sector is conducted more intuitively rather than based on proven methodological and applied "evidence bases."

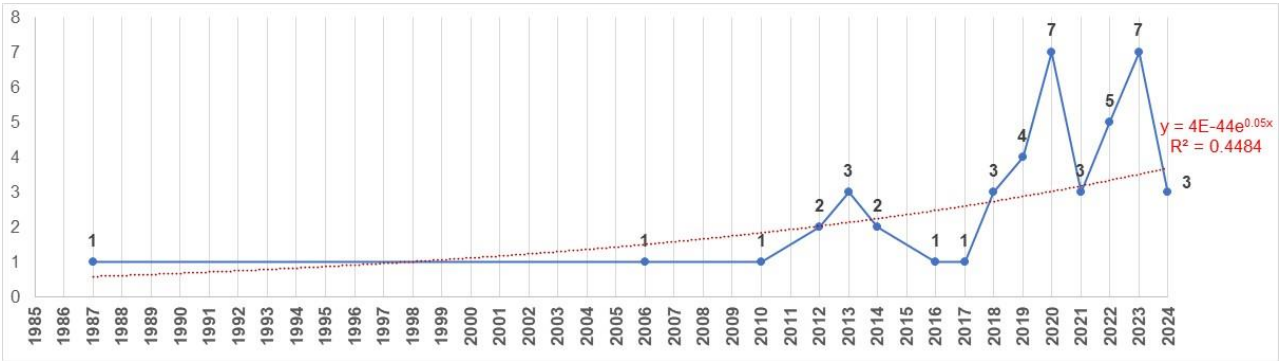
2. The analysis of sources on the issue of risk management in higher education institutions revealed insufficient development of this topic, both from methodological positions and in the applied context. At the same time, there is a need for bibliometric analysis, which not only allows for the identification and visualization of current research directions in this field but also helps to determine trends for future research on this topic. Therefore, the goals of this bibliometric analysis included:

- first, determining the current level of scientific interest in the issues of risk management in higher education;
- second, identifying the most relevant research directions in this area;
- third, revealing the main trends in further research on risk management in higher education institutions.

The bibliometric analysis of the dynamics and structure of existing research on risk management in higher education institutions was conducted using VOSviewer software, based on the Scopus database. The key search term was "risk management in university." Based on this search query, the Scopus database provided 44 works, starting from 1987 to 2024. The increase in the number of works over the last 5 years, starting from 2018, reflects a growing interest in the topic of risk management in higher education institutions, with a particularly sharp increase observed in recent years (Figure 1). The trend line is exponential, with a coefficient of determination (R^2), also known as the "goodness of fit," equal to 0.448.

Figure 1

Publication activity in research on risk management in higher education institutions in the Scopus database from 1997 to 2024

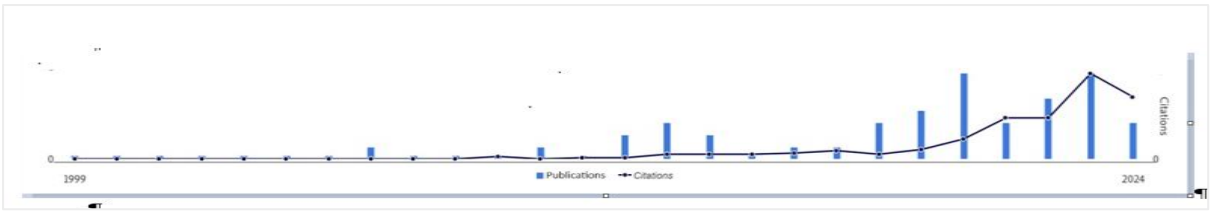


Note: Scopus database

This trend is also observed in the number of citations of articles on the studied problem (Figure 2). Currently, the average number of citations per work in this area is 9. Moreover, earlier published studies have a large number of citations.

Figure 2

Dynamics of citations of publications on risk management in higher education institutions in the Scopus database from 1999 to 2024



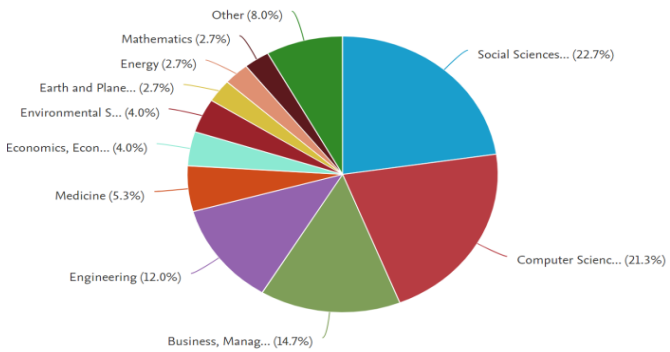
Note: Scopus database

Discussion

The results of the analysis demonstrate the interdisciplinary nature of existing research on risk management in higher education, with studies being published across various categories within the Scopus database (Figure 3). The highest number of publications falls under the category "Social Sciences" (17 publications, or 22.7% of all published works).

Figure 3

Distribution of research on risk management in universities by Scopus categories

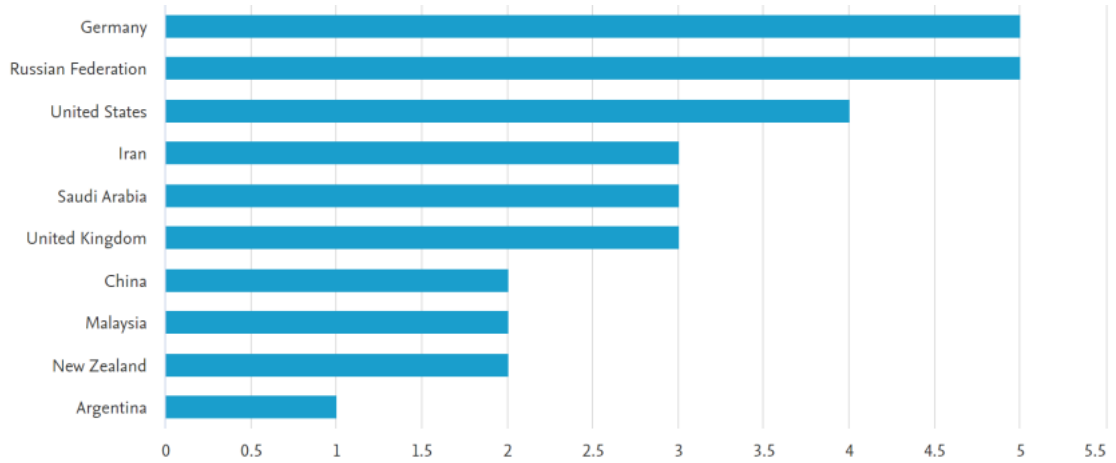


Note: Scopus database

The geographic distribution of the published works in the Scopus database on risk management in higher education institutions shows a concentration of scientific interest in this issue in Germany, Russia, and the United States (Figure 4).

Figure 4

Geographical coverage of research on risk management in universities

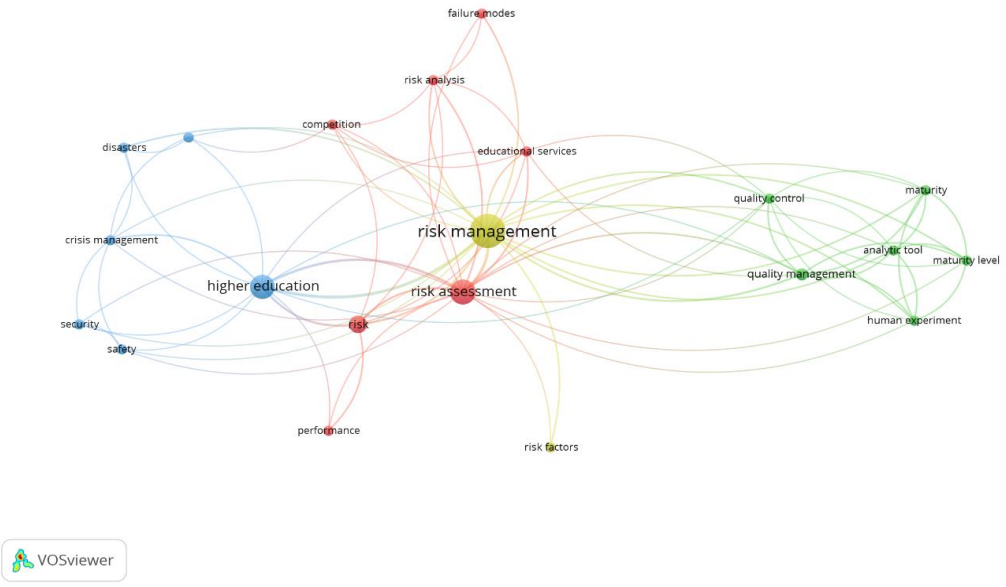


Note: compiled by the authors based on the Scopus database

A significant phase of the research was the construction of a scientific map of thematic clusters based on the keywords used in existing studies on risk management in higher education institutions, identifying the network of connections between the studied terms and their genesis. For the purposes of terminological mapping using the VOSviewer software tool, the Co-occurrence: Author keywords method was applied, based on which a specialized thesaurus of 30 keywords was compiled, grouped into 4 thematic clusters by their semantic proximity, identity, and intensity of joint use (Figure 5).

Figure 5

Bibliometric scientific map of thematic clusters of existing research on risk management in universities in the Scopus database



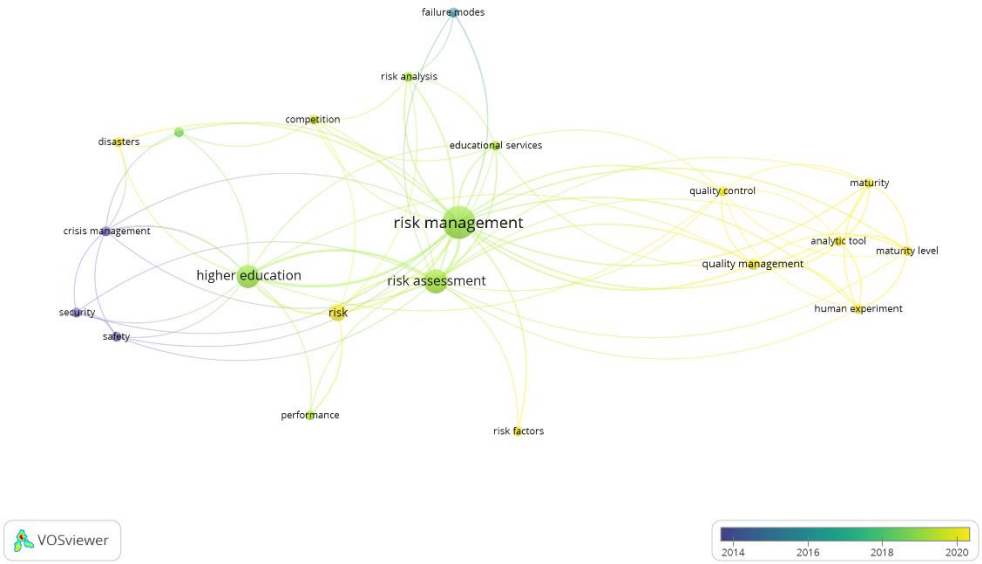
Note: compiled by the authors based on the Scopus database

In the presented bibliometric cluster map of research on risk management in higher education institutions (Figure 5), the thematic clusters are highlighted in different colors, with the size of each keyword label (node and font size) reflecting the strength and frequency of its connection with other keywords ("total link strength"). The lines between concepts represent the relationships between them and their joint use ("link strength"). Keywords in Figure 5 are depicted as circular areas. The larger the circle, the higher the frequency of joint use of the concept, and the network lines represent the connections between these concepts. A content analysis of the keywords in the 44 selected publications allowed the identification of 4 interconnected conceptual clusters, which we provisionally labeled: "Risk Factors in University Risk Management" (yellow cluster), "University Risk Assessment" (red cluster), "Crisis Management in Universities" (blue cluster), and "Quality Management in Universities" (green cluster).

We then examined the distribution of keywords over time, according to the degree of their development in the selected studies dedicated to risk management in higher education institutions (Figure 6). The closer to purple and blue, the "older" the research, and the closer to green and yellow, the more recent. The results indicate that in recent years, there has been a shift in scientific interest from crisis management issues in universities to questions of strategic risk management and assessment in the context of quality management in higher education.

Figure 6

Distribution of keywords by time in existing studies on risk management in universities, according to the Scopus database

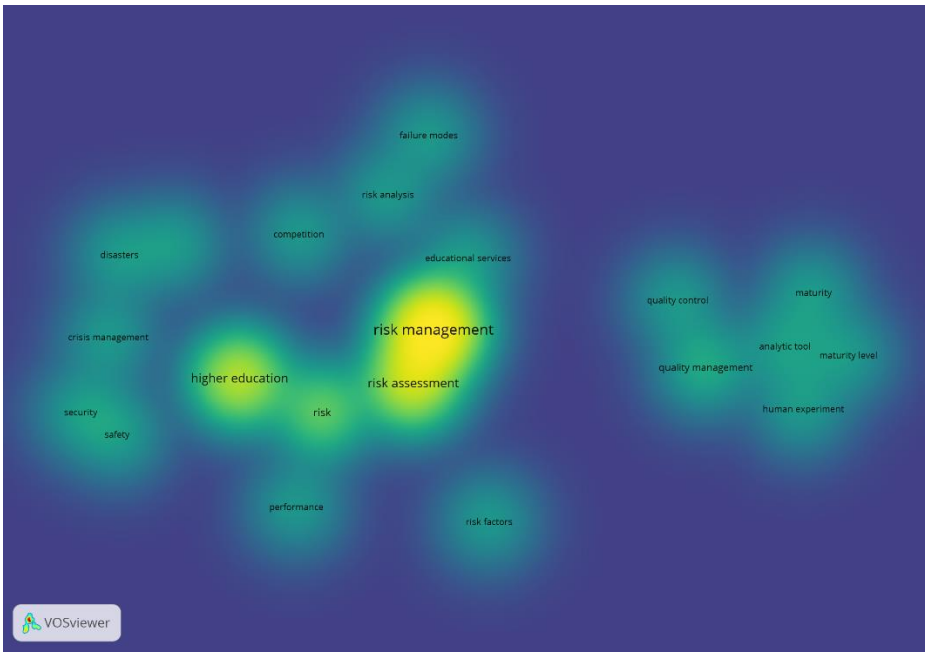


Note: compiled by the authors based on the Scopus database

Additionally, "hot areas" were identified in studies on risk management in higher education institutions, i.e., the most relevant concepts with a significant number of published articles (Figure 7). These areas on the bibliometric map, represented in a more intense yellow color, contain the highest number of scientific publications, particularly related to the issues of university risk assessment and identification.

Figure 7

Current topics ("hot areas") in existing research on risk management in universities in the Scopus database



Note: compiled by the authors based on the Scopus database

Conclusion

Thus, the conducted research on the bibliometric analysis of published studies on risk management in higher education institutions, based on the Scopus database, allowed us to:

1. Form a relevant sample of published scientific works on risk management in higher education institutions from the Scopus database;

2. Identify the dynamics of publications on risk management issues in higher education institutions in the Scopus database from 1987 to 2024;

3. Map thematic clusters based on the keywords used in existing studies on risk management in higher education institutions, identifying the network of connections between the studied terms and their genesis;

4. Identify the most important scientific trends and directions in this research area, as well as the concentration of scientific interest within four research clusters: "Risk Factors in University Risk Management," "University Risk Assessment," "Crisis Management in Universities," and "Quality Management in Universities."

Within the framework of this study, an analysis was conducted on the research frontier of risk management in higher education and the categorical structure of its framework based on a review of existing studies in this subject area, identifying dominant trends and benchmarks. Overall, the problem of building an effective risk management system in higher education institutions is relevant across the global educational landscape. However, in the context of post-Soviet higher education systems, this issue is not at the forefront, although some aspects of the experience of developed countries in this context are being utilized. The systemic implementation of measures to introduce risk management in universities is hindered by qualitative differences in our socio-economic environment. Higher standards of higher education quality, a developed organizational culture of top foreign universities, a high level of university intellectual capital, and the high scientific and educational potential of developed countries allow them to more effectively structure and expand risk management mechanisms in higher education. At the same time, it is important to understand that systematic work by a

university on the implementation of an effective risk management system is necessary for any higher education institution for further dynamic and progressive development and the fulfillment of its social mission.

The study allowed us to formulate the following recommendations for improving risk management in universities:

- Increase the interest and involvement of university leadership and its structural units in creating an effective risk management system;
- Develop and adopt principles and a general concept of strategic and operational risk management in universities;
- Establish specialized risk management departments in universities and ensure their effective interdepartmental interaction within the framework of general mechanisms for ensuring the quality of higher education.

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Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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COMPARATIVE ANALYSIS OF FOREIGN EXPERIENCE IN IMPLEMENTING PSYCHOLOGICAL AND PEDAGOGICAL GUIDANCE FOR SOFT SKILLS DEVELOPMENT OF UNIVERSITY STUDENTS

Abstract. The article discusses modern methods and practices of psychological and pedagogical guidance for the soft skills development of students in higher educational institutions. With globalization and rapid technological progress, traditional teaching methods are becoming insufficient. The purpose of this study is to conduct a comparative analysis of modern methods and practices used in different countries, with the aim of adapting and introducing them into the higher education system of the Republic of Kazakhstan. The methodological basis of our research is a personal approach, which involves considering the individual characteristics of each student.

The analysis of international experience revealed effective methods, such as emotional intelligence development, active learning, coaching and mentoring, project-based and problem-based learning, gamification and the flipped classroom. These approaches demonstrate high effectiveness and can be adapted for use in the higher education system of the Republic of Kazakhstan. The introduction of these methods helps to improve the quality of education, improve the employment of graduates and their competitiveness in the labor market. Successful integration of these practices will require adaptation to local conditions and training of teachers, which will significantly increase the level of specialists' training in Kazakhstan.

Key words: soft skills, psychological and pedagogical guidance, foreign experience, university students, development, higher education.

Introduction

The modern higher education system faces numerous challenges, among which one of the key ones is the need to train specialists who have not only professional knowledge, but also a developed set of soft skills. In the context of globalization and rapid technological progress, traditional teaching methods can no longer fully meet the needs of students and employers. In this regard, there is a need to study and implement advanced techniques and effective practices of psychological and pedagogical guidance for the soft skills development.

The concept of higher education and science development in the Republic of Kazakhstan for 2023-2029 pays special attention to the curricula revision and optimization of the university graduate model. The main focus is on developing key competencies that meet current and future labor market needs (MES RK, 2023).

These measures are aimed at improving the quality of higher education and increasing the employability of graduates, which, in turn, helps strengthen their position in the labor market. In his adress to the nation "Constructive public dialogue – the Basis of Stability and Prosperity of Kazakhstan", President Kassym-Jomart Tokayev noted that only half of the country's universities achieve a graduate employment rate of 60 % (Tokayev, 2024).

This highlights the need for further efforts to integrate education and the labor market. Modern employers strive to find specialists who have not only professional skills and knowledge (hard skills), but also soft skills, such as communication skills, critical thinking,

teamwork, leadership, and adaptability. These qualities allow organizations to strengthen their position and gain a competitive advantage in the market through human resources.

The object of our research is the system of psychological and pedagogical guidance for the soft skills development in higher education of various countries. Research subject: methods and practices used in foreign universities to develop soft skills among students, as well as the possibility of their adaptation and implementation in the higher education system of the Republic of Kazakhstan. Thus, we formulated the following hypothesis: adaptation and implementation of advanced methods and practices of psychological and pedagogical guidance for the soft skills development used in foreign universities into the higher education system of the Republic of Kazakhstan will improve the quality of education and increase the level of graduates' employment who meet the requirements of the modern labor market .

The goal of this study is a comparative analysis of modern methods and practices used in different countries, for their adaptation and implementation in the higher education system of the Republic of Kazakhstan. Research objectives:

1) analyze and compare modern methods and practices of psychological and pedagogical guidance for the soft skills development, used in leading foreign universities;

2) assess the possibilities and prospects for using these methods in Kazakhstani universities.

Research methods include analysis of literature and documents on the soft skills development in higher education institutions, study of scientific publications, reports, strategies and recommendations, as well as analysis of programs and methods used in foreign universities.

Psychological and pedagogical guidance in the soft skills development among students of higher educational institutions is of critical importance for the formation of readiness for modern challenges of the labor market, since it not only contributes to holistic personal growth and improvement of interpersonal skills, but also allows for the individualization of training, including the latest technologies in the process and teaching methods.

Literature review

The term "soft skills" refers to skills that are not directly related to professional qualifications and include abilities in the areas of communication, time management, teamwork, etc. The Cambridge Dictionary defines "soft skills" as personal qualities that contribute to effective and harmonious interaction with other people, including productive communication skills (CD, 2024). However, even this voluminous definition does not exhaust the full content and depth of the concept of "soft skills".

Various researchers explore the concept of "soft skills" through different aspects. Majid et al. (2020) consider soft skills, social skills and people skills as synonyms, describing a set of competencies that includes communication skills, problem solving and leadership. Hurrell's (2016) study examines how soft skills contribute to career development and improved employability, especially in an ever-changing labor market. Raitskaya & Tikhonova (2018) define "soft skills" as a set of non-professional skills, abilities and qualities necessary in the labor market for the successful application of professional competencies.

At the international economic forum in Davos, a forecast of the most valuable competencies for 2020 was presented. Key skills included: complex problem solving, critical thinking, creativity, teamwork, and emotional intelligence. These skills are essential to working successfully in an environment of technological change and automation that is radically changing workforce requirements. It is predicted that by 2025, 50 % of all employees will require retraining due to the increased use of technology (WEF, 2020).

The importance of these soft skills has been confirmed by many studies showing that they will become increasingly in demand in the job market. During this study, psychological

and pedagogical guidance for the soft skills development of university students will be organized with an emphasis on the development of the above-mentioned soft skills.

The research team analyzed modern methods and practices of psychological and pedagogical guidance for the soft skills development of university students, used in different countries, with the aim of adapting and introducing them into the higher education system of the Republic of Kazakhstan. The following is an analysis for 7 countries:

Czech Republic: The Czech Republic uses the project-based seminar methodology, where students work on long-term interdisciplinary projects, developing skills in critical thinking, problem solving and collaboration (Balcar, 2018).

Teachers act as consultants, which promotes student independence and creativity. Educational programs actively use interactive lectures and seminars, including discussions, role-playing games, and simulations to develop communication and analytical skills.

Finland: Finnish curricula include projects across a variety of subject areas, increasing student motivation and ability to apply knowledge in practice. Aalto University (Finland) actively uses game-based teaching methods. In game development programs and interdisciplinary projects, students develop soft skills through gamification (Hamari & Koivisto, 2015). Researchers from Aalto University show that gamification can support long-term motivation and engagement among students.

Germany: In Germany, dual study programs are a cornerstone of the educational system, seamlessly blending theoretical learning at universities with practical training at companies. This unique approach not only equips students with essential professional skills but also emphasizes the development of crucial soft skills like adaptability, teamwork, and problem-solving. By gaining hands-on experience in real-world settings, graduates from these programs are exceptionally well-prepared and competitive in the labor market, making them highly sought after by employers for their practical expertise and holistic skill set (Cinque, 2016).

USA: in the USA, the method of problem-based learning (PBL) is actively used, where students solve real problems and tasks in the educational process (Deep et al., 2020). It develops critical thinking, collaboration and problem-solving skills. Coaching and mentoring methods are also widely used, where experienced mentors help students develop personal and professional qualities. Harvard University and other leading universities include Emotional Intelligence courses in their MBA programs and other courses to help students improve their leadership and management skills. Also, the “flipped classroom” technique is widely used to develop soft skills in students, giving them the opportunity to study theoretical materials at home and actively participate in practical exercises in the classroom (Moundy et al., 2022).

For example, Stanford University uses this technique in engineering and computer science, where students watch video lectures at home and participate in discussions and projects in class, which promotes the development of critical thinking, communication, and problem-solving skills.

England: In England, the educational system places a strong emphasis on developing soft skills through interdisciplinary projects, practical assignments, and personal development programs. These initiatives aim to cultivate creative thinking, problem-solving abilities, and teamwork skills essential for navigating modern professional environments. Career counseling services are also integral, guiding students in career planning and leadership development. Additionally, the integration of emotional intelligence programs within the curriculum, exemplified by institutions like the London School of Economics (LSE), underscores England's commitment to equipping students with the interpersonal and communication skills necessary for success in both academic pursuits and professional life (Cheng-Huan &Yong-Cih, 2019).

In the Netherlands, Project-Based Learning has been introduced, integrating students into real-world projects. This approach significantly enhances collaboration skills, promotes creative thinking, and cultivates the ability to solve complex problems effectively. Mandatory

project modules within educational programs further encourage students to develop independence, take responsibility, and prepare for professional challenges (Cinque, 2016).

Italy: In Italy, interactive lectures and seminars are actively utilized, incorporating discussions, role-playing games, and simulations. These methods are designed to enhance students' communication and analytical skills. The use of interactive technologies encourages active participation and engagement among students, thereby enhancing their preparedness for professional endeavors (Rossi et al, 2021).

This analysis allows us to identify and compare the most effective methods of psychological and pedagogical guidance for the soft skills development of university students.

The results of the study and discussion

Based on the comparative analysis of foreign experience in the implementation of psychological and pedagogical guidance for the soft skills development, we have identified methods that show high results in various educational institutions around the world and can be adapted for use in the higher education system of the Republic of Kazakhstan. A description of methods, effective practices, and the possibility of their adaptation in the Republic of Kazakhstan are presented in Table 1.

Table 1

Methods of psychological and pedagogical guidance of soft skills development of university students

No	Methods	Description	Effective practices	An example of method's adaptation in the Republic of Kazakhstan
1	Methods for developing emotional intelligence (EI) Kondratenko et al., 2020)	- EI includes understanding and managing one's own emotions, as well as the ability to recognize and influence the emotions of others; - development of EI helps improve interpersonal interaction and leadership skills	- trainings to develop self-awareness and empathy; - role-playing games and simulations; - feedback and coaching	- implementation of emotional intelligence courses into educational programs; - conducting regular trainings for students and teachers
2	Active Learning (Rossi et al, 2021).	- active learning includes a variety of methods that stimulate the active participation of students, such as discussions, group projects, interactive tasks; - this approach helps develop communication, collaboration and critical thinking skills	- use of technologies for interactive learning (for example, educational platforms, interactive whiteboards); - organization of discussions and debates; - implementation of active methods in lectures and seminars	- integration of active learning into traditional lectures; - advanced training of teachers to use active methods
3	Coaching and mentoring techniques (Rahimova et al., 2021)	- coaching and mentoring are aimed at individual support for students, development of their personal and professional skills; - mentors and coaches help students set goals and develop plans to achieve them	- mentoring programs with the participation of graduates and professionals; - regular individual consultations and coaching sessions; - organization of mentor clubs and communities	- coaching and mentoring systems implementation at universities; - cooperation with enterprises to attract professional mentors

4	Project-Based Learning, PBL (Cheng-Huan &Yong-Cih, 2019).	- project-based learning involves students in the implementation of projects that require the use of various soft skills, such as teamwork, communication, creative thinking and problem solving; - students work on real problems or tasks, which allows them to develop practical skills	- creation of interdisciplinary projects; - inclusion of real tasks from industry partners; - regular presentations and reflection on projects	- implementation of mandatory project modules into educational programs; - cooperation with local enterprises to develop relevant projects
5	Problem-Based Learning, PBL (Cinque, 2016).	- problem-based learning focuses on solving complex problems that require students to use analytical skills, critical thinking and the ability to work in a team; - students explore and find solutions through discussions and collaboration	- development of scenarios for real problems; - use of case stages and situational tasks; - group work and discussions	- implementation of PBL into courses in various specialties; - conducting regular seminars and workshops on problem solving
6	Gamification (Garcia et al., 2020)	- gamification includes the use of game elements in the educational process to increase motivation and involvement of students; - promotes the development of teamwork, leadership and strategic thinking skills	- implementation of educational games and simulations; - use of a system of awards and achievements; - organization of competitions and challenges	- gaming applications development for teaching soft skills; - holding competitions to solve real business cases
7	“Flipped Classroom” method (Moundy et al., 2022).	- students study new material at home and perform practical assignments and projects in class; - allows you to actively use class time to develop soft skills through discussions and group work	- preparation of video lessons and materials for self-study; - organizing discussions and collaboration in the classroom; - emphasis on the practical application of theoretical knowledge	- integration of the flipped classroom into curricula in various disciplines; - creation of an online platform for access to educational materials
8	Community-Based Learning (Cinque, 2016).	- learning in the community includes students participation in projects and initiatives aimed at solving real problems of local communities; - helps develop collaboration, social responsibility and leadership skills	- participation in volunteer projects and social initiatives; - cooperation with local organizations; - organization of student clubs and associations	- implementation of mandatory modules on community learning into curricula; - partnership with local and public organizations

9	Project seminars (Abdulaeva & Kurbanova, 2023).	- students work on long-term projects, which allows them to apply theoretical knowledge in practice	- students are united in groups to complete projects, often interdisciplinary; - teachers act as consultants rather than lecturers, which promotes the development of independence and creativity	- implementation of mandatory project seminars into educational programs; - organization of interdisciplinary projects involving students from different faculties.

The analysis revealed that the most effective methods of psychological and pedagogical guidance for the soft skills development, such as methods for developing emotional intelligence, active learning, coaching and mentoring, project-based and problem-based learning, gamification, flipped classroom and community learning, have significant potential for use in system of higher education of the Republic of Kazakhstan. These approaches not only promote the development of key soft skills such as communication, critical thinking, collaboration, and leadership, but also increase student motivation and engagement in the learning process. For example, the gamification technique, which uses game elements to stimulate learning activity, has shown high results in universities in the USA and Finland. Research confirms that gamification can significantly increase students' long-term motivation and engagement in the educational process.

In addition, methods such as community learning and project-based learning help students apply theoretical knowledge in practice, developing their professional and personal qualities. The implementation of these methods into Kazakhstani universities will require adaptation to local conditions and cultural characteristics, as well as training of teachers in new methods. It is important to note that the successful integration of these approaches can significantly improve the quality of education, improve the employment of graduates, and strengthen their position in the labor market, which corresponds to the goals of the Concept for the Development of Higher Education and Science of the Republic of Kazakhstan for 2023–2029.

Conclusions

The introduction of advanced methods of psychological and pedagogical guidance for the soft skills development into the higher education system of the Republic of Kazakhstan is a strategically important step to improve the quality of specialists' training. These methods, tested in various educational institutions around the world, have proven their effectiveness in developing the key competencies necessary for successful professional activity in the modern labor market. Their adaptation and integration into the educational programs of Kazakhstani universities will not only increase the competitiveness of graduates, but also ensure their better readiness to solve complex problems in professional life.

The successful implementation of these methods requires an integrated approach, including training teachers, developing new educational materials, and creating conditions for the active participation of students in the educational process. Collaboration with international partners and exchange of experience will help speed up this process and adapt best practices to local conditions. Thus, improving the quality of higher education in Kazakhstan will contribute to the development of human capital, which is a key factor in the sustainable economic growth and social progress of the country.

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INTEGRATION OF THE UNIVERSITY STUDENTS' KNOWLEDGE THROUGH NEW INFORMATION TECHNOLOGIES

Abstract: The article touches upon the ways of implementing the integration of the university students' knowledge through new information technologies, the content and methodology of integrating the knowledge of students based on the use of new information technologies in the educational process of the university, and as well as the results of specially organized practical-experimental work. The authors conducted research to integrate the improvement of the quality of education through information technologies. The purpose of the research is to justify theoretically the integration of university students' knowledge through new information technologies and to prove its effectiveness in practice.

Pedagogical aspects of the modeling process, stages of pedagogical modeling are presented in the article. The article also presents the methodological, procedural (technological) and instrumental levels of the model, its purpose, monitoring of the formation of necessary competencies, as well as the result. The model shows the logical-structural nature of the implementation of integration of the university students' knowledge through new information technologies, the rules, principles, and conditions of competence formation. Students can master the integrated educational material through new information technology equipment, understanding the importance of digested knowledge, it is determined that one can use it independently as needed, and it is proven that the quality of individual education is at a high level.

The study touches upon the process of integrating the knowledge of university students using the concepts of "The use of new information technologies", "Integration through new information technologies", and formed a reference of the scientific and methodological basis for the integration of students' knowledge through new information technologies. From scientific point of view, the methodological basis for the development of integrated programs and projects in general education and special disciplines, including the specifics of the information technology, has revealed the decisions of the task.

Keywords: information technology, educational process, integration, scientific research, pedagogy, knowledge.

Introduction

The future of modern education is determined by the development process of society, the desire for scientific integration of knowledge, the various origins of the accumulated and constantly growing amount of information in society. Current reconstructions in society, new strategic orientations in economic development, the openness of society, its rapid informatization and development radically changed the requirements for distant education. Authors are convinced that being a leading country in a developing society depends on qualified IT specialists.

The effectiveness of the informatization process directly depends on the development of the processes of creating and using an electronic information resource. The organization of educational activities of the university using electronic information resources involves the use of the latest pedagogical technologies that stimulate the development of the internal reserves of each student and at the same time contribute to the formation of the social qualities of students, that is, the use of new information technologies for learning which allows to solve didactic problems controlling the learning process.

Organization of the educational process at the university using new information technology contains two closely interconnected components. Firstly, great possibilities of modern information technologies are incomparable with previously used technical teaching tools, didactic material, which can and should be implemented in the educational process. Secondly, the widespread use of computers in the educational process depends on the training of personnel at the level of modern requirements. Therefore, the study and use of information and computer technology in the educational process is the most important component of students' preparation for further work.

Accelerating the economy is based on a digitization tool for product quality modernization, so increasing the prestige of higher education is one of the most important tasks of today's education system. For example, according to the data of the direction “Digital Kazakhstan”of the state program “Information Kazakhstan”, the content of information technology services in 2022 reached 70%, the share of services in the market reached 32.5%. The contents of the university have sufficient use in the optimization of the educational process, introducing new subjects that cover the latest achievements of science. In the study we use methods of adaptation of interactive technologies to the university system, methods based on integration of the educational process. Integration of the educational process is being realized by changing technical, software, information (content) and methodological conditions.

As stated in the state program for the development of education in the Republic of Kazakhstan for the years 2020-2025, integration and globalization are going on simultaneously, the quality and level of education in higher educational institutions are comprehensively raised, new technologies of teaching and education are used daily and only teachers who know how to use information technologies in their work will be fruitful (Government of the RK, 2019).

Modern science and industry are simultaneously developing in the direction of specialization and integration. In the form of activities related to their profession, there is a growing need for specialists in a wide range of fields capable to mobilize and use the knowledge gained from various fields of science (Government of the RK, 2010). In the training of such specialists the main attention is paid to the development of systematic thinking, the ability to see the object in the unity of multifaceted connections (Billett, 2015).

The importance of the results of integrated knowledge, general scientific ideas, methodological principles, and the method of systematic analysis has increased in modern society, so teaching students of scientific integration products has become one of the main tasks of higher educational institutions (Davletova et al., 2021). From this point of view, implementation of interdisciplinary integration in the education system is an urgent problem. Because it contributes to the increase of its efficiency by combining all the structural elements of the educational process — the content, forms, and technology of education into one whole (Davletova et al., 2021).

Interdisciplinary integration ensures the assimilation of knowledge, the formation of business skills and abilities in a certain system, contributes to the active thinking activity, the combination of students' theoretical knowledge with educational and production activities. The implementation of interdisciplinary integration allows them to expand the professional training of qualified specialists and train them in a group of related professions (Yerzhanova rt al., 2021). The research also touches upon the cases of persons who have mastered several

professions, acquire new knowledge, establish a connection between previously acquired and new knowledge, and use integrated knowledge in professional activity (Medeshova et al., 2022). Scientific, including scientific-pedagogical literature has a certain amount of experience in studying the problem of integration. It means that it has become the leading law of development of educational theory and practice.

Such scientists as Kurmangaliyeva (2016), Chebanov (2016), Dakhin (2010), Kudryavtseva (2014) considered the importance of information in modern higher education in the country and the ways to integrate the knowledge of university students through new information technologies.

In general, the problem of integration is considered to be a complex branch in pedagogic science that is considered from the philosophical, psychological, didactic and methodological aspects. In our research we focused on each of these areas separately. Since analysis of research sources is a necessary condition for any research to achieve its goal, researches related to integration processes have also been analyzed.

"Integration" means creating a whole and inseparably connected whole. There are many definitions of this concept in modern literature. The article also considers the general scientific meaning of the concept of integration and its interrelationship with other related philosophical concepts. Integration (Lat. integratio - restoration, integer - whole) is a system theory concept that expresses the state of connection of individual differentiated parts with the whole, and the process leading to this connection. Let's focus more on the object of integration - knowledge, and what should be understood by the integration of knowledge. Information about the world and people finds its expression in social experience and becomes the content of knowledge in an adapted form. These characteristics can be considered within the framework of system-complex approaches, and we can talk about the emergence of a new quality of the whole from dialectically connected parts (knowledge, structure, methods of action), and these characteristics involve integration (Klimenko, 2005).

Research methodology and methods

The purpose of the study: theoretical substantiation of integration of university students' knowledge through information technologies and prove its effectiveness.

Scientific forecast of the research: If the university's educational process is efficiently used, the knowledge of students will achieve the integrated new quality results, as the use of new information technologies will contribute to the development of students' information competencies.

Objectives of the study:

- to determine the theoretical foundations of new information technologies in the integration of knowledge of the educational system of the university;
- to identify and develop a structural model of pedagogical conditions for integration of university students' knowledge through information technologies;
- to develop methods for integration of university students' knowledge through information technologies and check the effectiveness of experimental experiments;
- to introduce scientific and methodological recommendations for the integration of students' knowledge through information technology.

Methodological and theoretical foundations of the study: theory of dialectical cognition, the principle of dialectical interaction of theory and practice in scientific knowledge; philosophical rules on the general communication and interdependence of this phenomena; basic rules of methodology of pedagogy and research methods; theoretical concepts of integration theory, system theory, didactic systems, the essence of cybernetic and systematic points of view, the essence of new learning information technology and the ability to use them in the educational process.

Sources of research: studies of philosophers about knowledge, personality, education; State standard for higher education, basic curriculum, personal experience of the university.

Research methods include theoretical analysis of psychological, pedagogical, philosophical, methodological literature on the research problem, study of pedagogical publications and regulatory documents, advanced pedagogical practices, comparative analysis, questionnaires, design of didactic models, computer programs for the educational process, statistical analysis, conducting practical and experimental work, evaluating, processing, summarizing its results. In our work we consider the category of knowledge taking into account the above mentioned components of human experience, because the integration of knowledge becomes a new structure of information about the surrounding world, integrated methods of action, object and tool of action; evaluation of the existing reality and the qualitative level of the relationship. Therefore, we understand the integration of knowledge in terms of competence that is knowledge, methods of action, value relationship to reality and experience (Mukhametzyanova, 2002).

For these purposes the following means of information technologies are used in the university educational process: providing textbooks and other printed material; sending the studied materials on computer telecommunications; discussions and seminars conducted through computer telecommunications; modern applied programs (Word, Excel, PowerPoint, Access); Internet, including email; bilateral video television conferences; electronic information resources.

The main stages of the study: at the first stage (2010-2012) an analysis of scientific works on the integration of education and the use of new information technology were collected. On the basis of the analysis, the new information technology has the opportunity to integrate students' knowledge. Theoretical, educational and methodological documents, best practices and scientific equipment were identified in connection with integration of students and informatization of education.

In the second stage (2012-2016), experimental work on the use of information technology in the educational process was carried out and its' pedagogical conditions were identified, a structural model has been developed and tested. Integrated curricula and projects were developed and implemented in the educational process of the university.

In the third stage (2016-2022) concrete conclusions on the basis of experimental work have been made. The methodological effectiveness of the work was checked and the results were included in practice, recommendations have been prepared.

Scientific novelty and theoretical significance of the research:

- The process of integration of university students' knowledge was theoretically justified in terms of the use of information technology;
- the concept of "integration of university students' knowledge through information technology" was identified;
- scientific and methodological basis for the integration of university students' knowledge through information technology was developed;
- the specifics of the information technology, the methodological basis for the development of integrated programs and projects of general education were identified.

Practical significance of work:

- integrated programs have been developed and implemented in practice, which will allow the university's educational process to implement the integration of knowledge in general and special disciplines;
- projects were developed and tested as a result of integrating students' knowledge.

The hypothesis of the study is to determine the essence and content of the implementation of knowledge through new information technologies and the structure of projects for the integration of students' knowledge through new information technologies, the creation of its

criteria. The scientific and methodological effectiveness of integration of students' knowledge through the use of new information technologies has been proven.

The current transformations in society have radically changed the requirements for new strategic guidelines in the development of the economy, its operational information and rapid development. In order to form the competencies of graduates, the need to develop the ability to integrate knowledge is determined. Researchers consider the integration, synthesis and analysis of knowledge as one of the most important issues in the process of mastering the content of education. The research studies the conditions to establish relations between previous and new knowledge, the use of integrated knowledge in professional activities.

Today university successfully uses various modern software products. For processing and preparing text documents and in the preparation of various types of reports, performances at scientific and practical conferences, text editors are widely used. MS Excel electric tables allow prepare curricula, various types of digital college reports, graphs, diagrams. In the computer class of the university one has the ability to use electronic resources at various stages of the lesson: when presenting new material - visualization of knowledge using the PowerPoint program; conducting virtual laboratory work using training programs; consolidation of the stated material using a variety of training programs and laboratory work; system of monitoring and testing of students' knowledge using control programs; when conducting integrated lessons according to the project method, the result of which will be the creation of Web - pages, conducting television conferences.

The use of information technology for the organization of the educational process significantly expand the possibilities of presenting educational information, can significantly increase students' motivation for learning, involve students in the educational process, increase the possibilities of setting educational tasks and managing the process of solving them, and also allow us to qualitatively change the control of students. One of the advantages of using the electronic information resource is the increased interest of students in the discipline taught, because it has high visibility, in it one can use animations, videos, sound support, additional material and more.

Today's competitive society is a self-learning society. Education in such a society is very important, because it includes all elements of independent education it is aimed not only at the cognitive form of the educational process, but also at the effective organization of the individual activities of the participants. In such a society new information and communication technologies based on information-space means of communication and information processing are forming a screen culture. Information technology can not only provide diversity and clarity of information, but also form information competence in various spheres of activity, such as industrial, scientific, management, organization, education (Meshcheryakov & Zemlyansky, 2009).

The frequently used term "new information technology" (NIT) is not far from a scientific point of view because its meaning is connected with current historical data, and the content of this term may change gradually. In the scientific and scientific-methodological literature it is observed that the concept of "new information technology" has not yet been properly formed, therefore, taking into account the fact that modern technologies are constantly updated in accordance with changes in society, focusing on the concept of "new information technologies" and differentiating the definitions given to it, we consider new information technologies and information software as the use of equipment and the implementation of the educational process of the university (Nekrasova, 2016).

The object of research: university educational process.

The subject of research is the integration of students' knowledge using new information technologies in the educational process of the university;

Research hypothesis: the meaning and substantive nature of the implementation of the integration of the university students' knowledge through new information technologies;

1) pedagogic conditions, structural model and its dimensions and indicators for the integration of students' knowledge through new information technologies;

2) content and structure of projects for integration of the university students' knowledge; effectiveness of integration of students' knowledge using new information technologies from a scientific and methodological points of view.

The process of integrating the university students' knowledge in our research work has been theoretically justified in terms of the use of new information technologies:

- a definition was given to the concept of "University students' knowledge through new information technologies";

- a scientific and methodological basis for the integration of students' knowledge through new information technologies was developed;

Taking into account the specifics of the information technology used the methodological basis for the development of integrated programs and projects of general education and projects were developed.

Education in the current competitive society is very important, because it includes all elements of independent learning and aimed at effective organization of personal identity. New information and communication technologies are based on communication and information processing. Information technologies can not only ensure the diversity and clarity of information, but also form information competence in various fields of activity such as industrial, scientific, management, organization, education.

Thus, today's information society has a priority to use information technology and digitization than other learning technologies. In order to use information technology (IT) in education, it is necessary to understand the terms in relation to it. Until now the processing of information is not provided as a whole interrelated approach; the general theory of information technology, the basic concept of information technology is detected. Use of information design and software in the educational programs, consulting systems of automation programs, expert-consulting systems, information and methodological software systems of the educational base will be of great importance in integration of students' knowledge.

The basic criteria assessment formulating the expected results in the course of study in higher education is a process based on comparing students' achievements. Preliminary identified assessment criteria for all participants of the educational process in accordance with the goals and content of education are the ability to understand and explain the use of materials with correct information, forecasting or interpretation of information, methods of collecting and processing of statistical data such as "Algorithm", "Information Security", "Online Security", "Plagiarism", "Web page", "Web server", "Website", "Web browser", "URL", "IP-address", "Domain name"; methods of presentation and measurement, the main technical means of storage, processing and transmission of information storage, purpose and principles of organization and operation of computer networks, purpose and classification of PC software; methods and tools for computerization of information models, basics of programming, stages of development of computer technology, types of information threats, as well as information protection tools.

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address", "Domain name"; methods of presentation and measurement, the main technical means of storage, processing and transmission of information storage, purpose and principles of organization and operation of computer networks, purpose and classification of PC software; methods and tools for computerization of information models, basics of programming, stages of development of computer technology, types of information threats, as well as information protection tools (Bapiyev, 2021).

The following levels of mastering the study material are based on assessment:

1) education;
2) understanding;
3) use;
4) analysis;
5) synthesis;
6) assessment.

The criteria for formation of the educational environment include a group of facts. This criteria allows to study the educational environment in the professional training of students. When describing the environment of the vocational education, we focus on its description and parameters connected with the criteria for formal education: to incorporate all subjects, objects and processes of education aimed at the interaction of all educational entities in higher training.

Thus, we have identified two groups of criteria: a) facting criteria for the quality of the effectiveness of pedagogical conditions; b) criteria for introducing the technology for integration of education in vocational training. The teachers have been offered to introduce independently the practical technologies presented in the study. In order to show the most complete results, participants of the experiment were divided into groups at the next stage of work.

With the implementation of the information system training it is possible to solve effectively the objectives of the formation of students' competencies. For example, one can highlight the experience of developing generalized ways to find out the ways for a solution of certain problems, to increase the basic concepts of the topic and strengthen the evidence of systematic analysis, its concepts and phenomena. Thus, the integration of university students' knowledge through information technologies means applied computer programs, general education and knowledge of professional and special subjects, formation of information competence.

Discussion and results

Currently new requirements for people's knowledge and labor skills were presented in the country within the implementation of the state program "Digital Kazakhstan". One of the objectives of this program is to increase digital literacy in the field of higher education. Development of digital education and the level of training of future specialists are aimed at reducing the differences between different regions. In the future education should provide equal access to educational products for students and teachers regardless of where they live. In this case digitization can completely change the education industry. Thus, it is estimated that teachers remain mainly the leader and organizer of the educational process. Digital education is a new system of education using information and communication technologies in the joint use of information, open educational resources, interaction and cooperation for continuous development of the student's competence and skills.

Preference will be given to the areas of informatization of education, such as the use of information design, information software in the integration of university students' knowledge; educational programs, consulting orientation systems, system of automation of educational programs; expert-consulting system, information and methodological software systems of the educational base; a set of applied software and manuals aimed at studying various subjects.

This will allow future professionals to fulfill effectively the tasks that the world needs to enter the entire educational space of leading countries.

The development of digital technologies, the rate of information exchange between the structures of modern society has increased the speed of learning and reduces research time. Further development of science is impossible without innovative changes in education. The current educational environment has changed significantly, electronic libraries, virtual laboratory works, mobile phones have appeared on the Internet in each student. Digital technologies entering educational institutions have a significant position among the factors that form the study, search, interest of each student, the formation of general research potential and its further development. Therefore, the research potential of university graduates is one of the most important characteristics of assessing the quality of education. It includes information (digital) technologies - modern innovative technologies or integration, modern educational environment and methods. Further development of higher education is one of the ambitions to train students and ensure their level of computer and information technologies in a large-scale process.

It is possible to solve effectively the objectives of the formation of students' competencies with the help of the implementation of the information system training. For example one can highlight the experience of developing generalized ways to find out a solution of certain problems, to increase the basic concepts of the topic and strengthen the evidence of systematic analysis and conclusions among its concepts and phenomena. This training environment is performed by an automatic information system and the connection between the elements is carried out in several modes. The consistency of the location of the material depends on the logic of the subject read. The advantages of such a system are as follows: an interactive whiteboard can provide a student with the additional information in the framework of the material under consideration and systematization of integrated knowledge (Amrenova, 2013).

Thus, the integration of university students through new information technologies is the general education, generalized knowledge of information in general professional and special disciplines, the formation of information competence of students' independent learning.

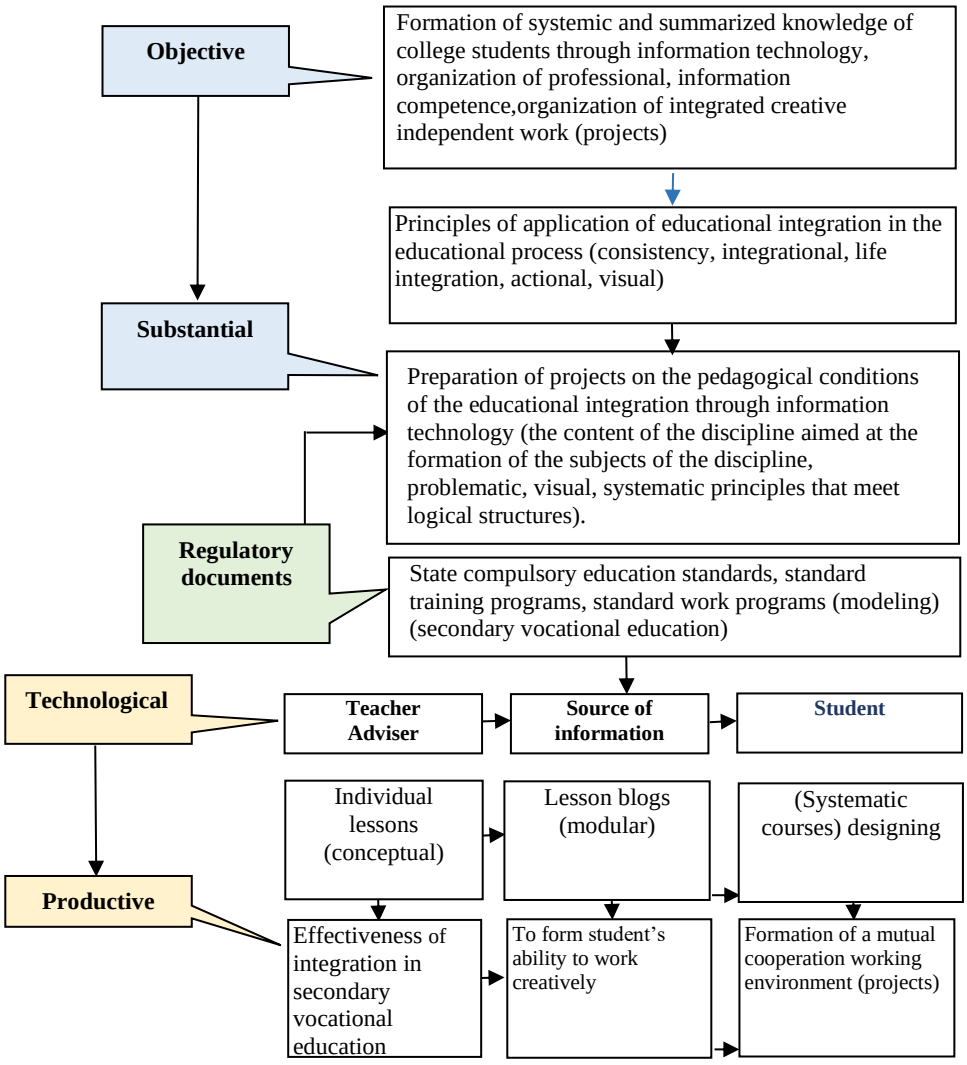
Effectiveness of integration of the university students' knowledge has been implemented on the basis of the following pedagogical conditions:

- taking into account the degree of readiness of teachers and students in the process of integration;
- taking into account the level of knowledge technology of students in accordance with the educational task;
- the integration of knowledge, the information technology can be processed only when the activity and behavior of students, self-knowledge, selection improving the creative level, mutual cooperation in the implementation of the conditions for the formation of the work environment.

The study developed a structural model for integration of the university students' knowledge through information technology based on theoretical bases and the aforesaid conditions (Figure 1).

Figure 1

Logical and structural model of integration training on the basis of new information technology



The first block is determined by the objectives of the study. The purpose of the development of university students' knowledge is carried out through the organization of systematic and summarized knowledge, formation of information competence, creative work (projects). Integration of the university students' knowledge depends on the acquisition of new information technologies. The content of knowledge mastered is provided in integrated curricula.

The scientific and theoretical foundations of achieving the goal, i.e. pedagogical principles and conditions of integration of knowledge, regulatory and methodological documents are provided in the second block. The integration of amendments to the student's actions and the characteristics of the implementation of students' knowledge through new information technology are carried out in the third block of the proposed model.

Teachers and students' interaction techniques, methods and forms of organization of students' learning interactive methods are considered by the methods of educational techniques used at the university. The fourth blog of the educational process will reveal the efficiency side of achieving the goal. The result is the solution of the set goal. Thus, the level of effective

integration in higher education, the formation of information competence of students, formation of creative independence of university students, the level of mutual cooperation is determined. In the integration of knowledge a problematic approach to integrating the concepts within a particular subject means if integration is covered by several topics and correspond to the problem-term approach to integration (Medeshova, 2024).

Block-modular approach requires the creation of an integrated block of various subjects. The choice of these views is determined by taking into account the specifics of integrated subjects, the specific problem and the level of training of students. This block is determined by problematic and thematic, problematic and course, block-modular criteria for integration of students' knowledge. Integration of concepts within a problematic and thematic size consists of understanding the relationship between subjects, understanding the relationship between problem-term individual disciplines, theoretical - practical substantiation, desiring, valuable orientation and competence.

At the highest level a university student understands any professional transactions, able to substantiate any action based on the competitive approach and able to work on a computer, search for professional information, use his knowledge in everyday life.

At the average level a university student can explain the meaning of some, sometimes most of the tasks in the framework of integration of the subjects in case if it is clearly defined; the integrated issue can be made in an unprocessed manner, in case of accumulated manner in a computer.

At a low level a university student understands the issue in terms of integration in a single subject, performs an action in the course of the same subject, does not justify its creative activities, does not guide the integrated tasks, and able to perform only personal unregistered operations.

The effectiveness of the integration of university students through new information technologies was investigated through experimenting with three stages. The research was conducted at the Zhangir khan West Kazakhstan Agrarian and technical University.

Table 1

Measurements, indicators and levels of integration of educational knowledge of university students through new information technologies

Measurements	Indicators	Levels		
		High	Average	Low
Problem-thematic	Information and competence level, integration of concepts within the same subject	Knows how to search and use professional information	Can integrate the information in terms of individualities	Understands the integration between the concepts and understanding in one subject area under the guidance of a teacher
Problem–course	Be able to understand integration knowledge among individual subjects, be able to use in their own theoretical and practical work	Fulfills any professional transactions integrating theoretical and practical knowledge	Understands the meaning of most of the tasks on the basis of integration of individual subjects, explaining the action to be performed as part of the integrated subjects.	Does the action in the version without thinking, but cannot justify his own creative activity

Block-modular	Passion, value orientation, trust, friendly relations	Can use integrated information in the professional field, act on an integrated basis and can work with friends in cooperation	The integration problem is solved in an unproceted state, able to perform a creative task together with friends on the computer	Cannot guide the integrated semantic structure of the task, it tends to perform only ready-made instructions in group work

The effectiveness of the integration of university students through new information technologies has been tested through a three-stage experimentation: identification experiment (2010-2012), formation experiment (2012-2016), final experiment (2016-2022).

In order to determine the level of readiness of university students during the experimental work, their educational activities were carried out on the basis of tests and tasks, surveys, conversations, interviews, classes in computer labs. According to the results of experiments, in the educational process of the university most teachers showed that they support integration of knowledge (92.4%), including 48.6% of them using integration often enough. During the survey only 26.3% of the university teachers showed that they use the integration of knowledge outside of classes, mainly during internships.

During the experiment it turned out that all teachers face the following difficulties: the lack of readiness and manuals (32.6%), lack of ready-made exercises and control tasks (48.2%), limitations of the possibility of using ready-to-use visuals, to increase the time of training (28%), non-compliance of programs (8.6%), high intensity of the lesson (3.8%), insufficient competence in other subject areas (3.8%). 82.6% of teachers do not use computer technology, about 55.2% have no adequate skills in their work, and 40.6% consider the lack of the necessary program, 25.6% have no access to the computer. According to the results of these indicators, pedagogical conditions for integration of the knowledge of university students through new information technologies were specified, a structural model was established, developed and identified methods and effective ways to implement it.

Experiment was conducted at the Zhangir khan West Kazakhstan Agrarian and technical University to integrate general education and special disciplines in the specialty “Information systems". An example of a problem-thematic approach to the conceptual integration of content was developed. As the course is considered as individual parts of the basics of computer science, the integration of knowledge was carried out through new information technologies.

Integration program on economic information processed courses was made up to create an integrated block of various disciplines included in the creation of the integration of students in various disciplines, the basics of this specialty and the provision of information and maintaining the information of the automated system. We described new information technologies that can be used effectively to integrate knowledge of university students. These technologies were used to assess the effectiveness of the learning process in terms of improving the integration of educational technologies in several common areas, including the integration of knowledge at the university and the integration of language skills of students (Davletova, 2018).

Students of this specialty took an active part in the preparation of projects, and each member of the group chose a suitable period. Finally, all collected data were analyzed, the program was created and the results were checked. The projects performed in the groups were discussed at the end of the term. This allowed students to identify vulnerabilities and work hard to work competitive. At first, students who have mastered the design worse were able to demonstrate their professional modular skills on subsequent topics, experimented in practice.

During the experiment business games were used to hold information technology. After all, the business games allowed to carry out simultaneously each type of action as an integrated

form of work, i.e. thinking, practical self-esteem, communicative activities were carried out. The content of students' knowledge helped to simulate the whole real life, taking into account the duties of learning through information technology, allowed to simulate the whole real life, as well as their self-determination, active interaction with other participants.

On the basis of the aforesaid, we can conclude the following: there were some changes in the work of the teacher in the implementation of knowledge integration using information technologies; the content of education (information services), the form of stimulating and monitoring of lessons (organizational activities), the interaction between the teacher and student (communication services) are being changed. There are new opportunities to analyze the results of the learning activity (progressive services). The new situation requires the teacher's performance; the purpose of integration on the basis of new information technologies requires the methodological support of the educational process and the attendance of qualification training courses by the teachers.

The high level of integration of knowledge at the university allowed develop creative abilities of students and existing methods of actions in solving new problems; be able to see the structure of the object; and to see the new activity of the object other than traditional. While implementing the tasks from 100 students only 5% achieved the high score, and the lowest group with an average of 50% (55% - in experimental groups, 45% - in the control group).

Students' independent work was organized on the basis of automated interactive communication through information technologies. Here the student reads the e-learning material, completes the task and immediately sees his results. And the use of new information technology allowed students to feel as an individual and increase responsibility. Also, interactive communication has proved that the importance of prescribed lessons is beneficial for both teachers and students. When interactive communication is not implemented, information technology was used as a means of demonstration, a visual aid. Thus, the possibility of integrating knowledge through new information technologies was determined and made sure that it will give a positive result.

According to this logical structure a special course was held at the university. Here students attended (theoretical training - 22 hours, laboratory classes - 18 hours) a special course called "Automated system of processing and use of economic information". The special course program was conducted in "Information systems" group (Table 2).

Table 2

Thematic program of a special course "Automated system of processing and use of economic information"

№	Name of sections and themes	Number of hours		
		Total	Theoretical classes	Laboratory classes
1	Introduction	2	2	-
2	Part I. Creating computer networks and information support			
3	1.1 Theme. Computable networks	4	2	2
4	1.2 Theme. Computable networks technique. Classification and coding of economic information	6	4	2
5	Part II. Database user information systems			
6	2.1 Theme. Simulation of database	6	2	4
7	2.2 Theme. Database architecture and requirements for them	4	2	2
8	2.3 Theme. Relevant database models	6	4	2
9	2.4 Theme. Designing a relevant database	4	2	2

10	Part III. Intellectual support of the management decision. "Client - server" architectural informatization systems			
11	3.1 Theme. Technology of automation of enterprise management	4	2	2
12	3.2 Theme. Description and structural language of SOLSERVER	4	2	2
13	Total	40	22	18

A special course curriculum was developed in accordance with the system "Technology - Science - Society". For example, the section "Intellectual Support" for university students is the logical structure of the course, including the section "Intellectual Support of Management" as a technological, scientific and social part. Technological part includes: 1. Objects of computer system. 2. New information technology. 3. Multimedia technologies. Scientific part includes: 1. Relationship of IT science and its relationship with other sciences. 2. Informatization of the education system. Information culture. The social and personal part identifies the social components of teaching influencing a person in an information society: 1. Educational aspects and developing creativity. Distance learning (Table 3).

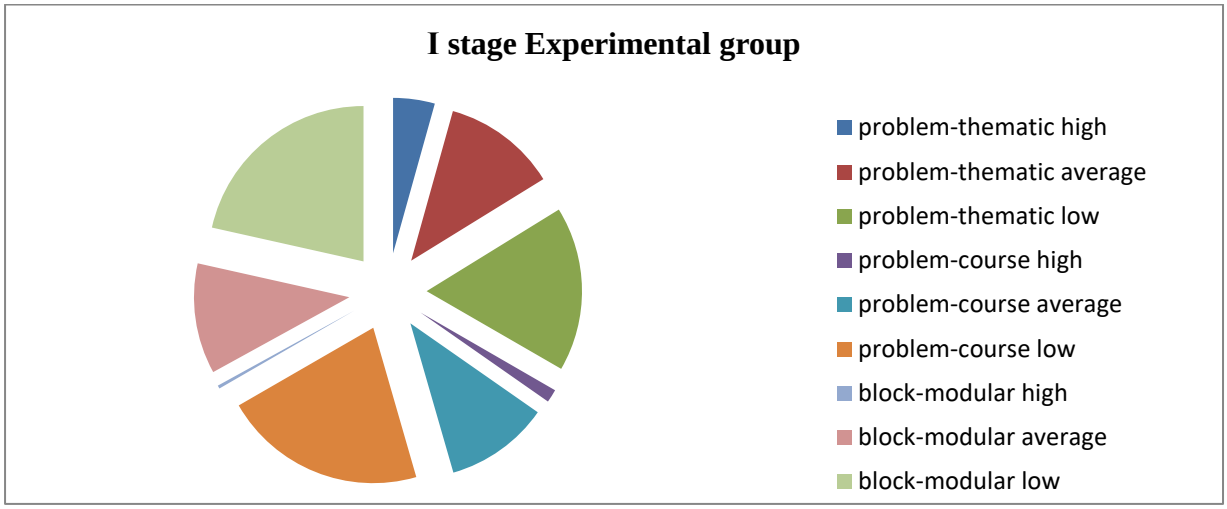
Table 3

Indicators of information technology for integration of the university students' knowledge

	Level	I stage		II stage		III stage	
		Experimental group	Control group	Experimental group	Control group	Experimental group	Control group
Problem - thematic	High	13	3	13,1	1	34,2	1
	Average	35,6	31,3	56,7	42,5	55,8	49
	Low	51,4	65,7	30,2	56,5	10	50
Problem – course	High	4,1	2,5	4,4	4,9	10,7	3
	Average	32,5	27,8	47,4	44,9	70,3	44,5
	Lo w	63,4	69,7	48,2	50,2	19	52,5
Block - modular	High	1	1	3,7	1	9	1
	Average	34,5	40	40	41	45	41,3
	Low	64,5	59	56,3	58	46	57,5

In order to create an integrated block of various disciplines included in the content of education, program-course integration program have been prepared for the students of 2 specialties studying the basics of marketing and basic economics in the market or / and maintaining information on automated systems. It is shown in Figure 2.

Figure 2
Indicator of the program for integration of the university students' knowledge



In the design method to provide information technology we need to work with independent electronic texts; to scan textual and graphic information; to analyze and summarize the information collected, to prepare and demonstrate the presentations.

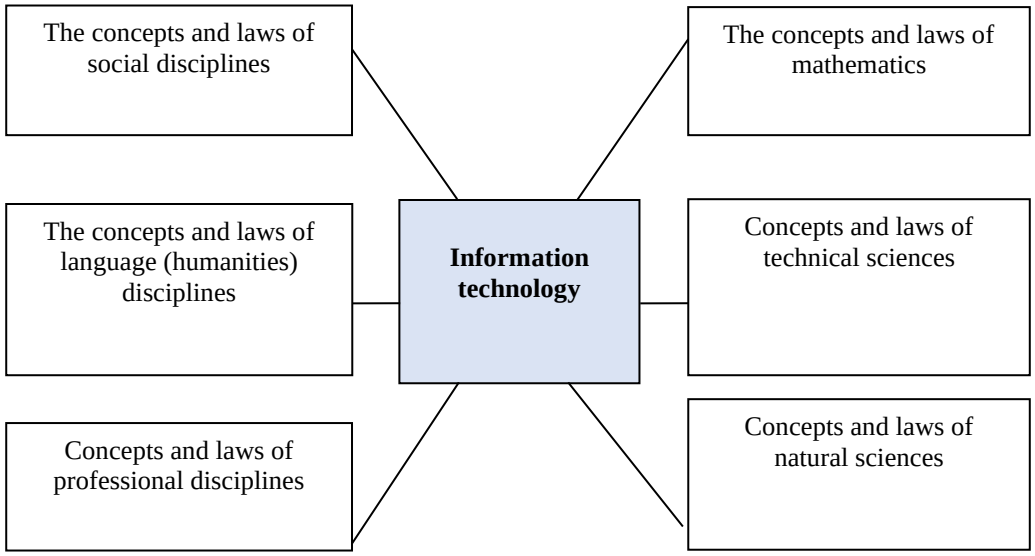
We described new information technologies that can be used effectively to integrate the university students' knowledge. These technologies were used to assess the effectiveness of the learning process in terms of improving the integration of educational technologies and the processes in several common areas, including the integration of knowledge and language skills of students at the university.

Then we considered the implementation of levels of conceptual, modular, expanded and operational integration on the structural model we offer in many universities. For example, information technology is based on computer science so we have made sure that it will be possible to integrate other sciences.

As shown in Figure 3, the integration of computer science through information technology is integrated with processing, storage of information with the help of Computer science, Technical sciences and Mathematics. Similarly, our research has proved that we can use information technology and all computer capabilities in teaching other scientific techniques. In particular, MathCad, AutoCAD, Education software is often used in the issuance of mathematical problems and considered as a part of Mathematics. This opens the way for students to use time and organize their work properly, to expand their range of knowledge.

Figure 3

Opportunity to integrate the basics of science through information technology



We have used great opportunities of business games in our practical experiment. After all, business game allowed carry out simultaneously each type of action as an integrated form of work, i.e. thinking, practice, self-esteem, communication, etc. The content of students helped to model simultaneously the tasks of various disciplines, including the current real-life situations, as well as full assessment of all the qualities of the person, its self-determination, active relations with other participants.

Conclusion

Theoretical research and the results of experimental work allow draw the following conclusions:

- philosophical, pedagogical and psychological approaches to the optimization of the educational process of the university are based on the system of complexity, competence, action of operational comments through new information technologies;
- "Integration of the university students' knowledge through new information technologies" is the application of knowledge in professional and special disciplines, the formation of information competence;
- the structural model of integrating the knowledge of university students using new information technologies is developed based on the conditions of self-summing and increasing the creative level of students and taking into account the degree of readiness of teachers and students for the integration process taking into account the students' level of information technology;
- methodological basis for the development of integrated programs of general education and special disciplines have been developed taking into account the specifics of the new information technology;
- projects have been developed and tested to integrate students' knowledge in general education, professional and special disciplines.

Currently, information technologies are widely used to organize the educational, research and managerial process of the university, which main characteristics are the possibility of differentiation and individualization of learning, as well as the possibility of developing creative cognitive activity of students. The integration of information technology in the formation of IT competencies increases the overall level of the educational process, enhances

the motivation of learning and cognitive activity of students constantly supports teachers in a state of creative search for didactic innovations. Information technologies in education are gradually turning from a tool for learning into a powerful means of developing the entire educational complex of the university.

During the information technologies era the methods of education and upbringing were subjected to significant changes. With the emergence of a computer, the implementation of many processes in human life is fast, reliable and effective. Currently, the terms such as "Electronic textbook", "Electronic government", "Digital Technology", "Education Integration", "Information Technology", and "Digitalization" are widely used in the educational process. The modern education system should not only give knowledge to the audience, but also use advanced information technologies in the educational process.

Summarizing the basis of theoretical principles and experimental work, the following recommendations were made:

- in addition to the use of new information technologies in the university educational process, the formation of information competence should be carried out;
- the results of the work should be used in the development of a new standard of higher education;
- the results of the work should be used to form information competence;
- in order to integrate students' knowledge, the methodology for the use of new information technology should be introduced to other universities;
- special courses should be conducted in order to increase the professional skills of students.

The article considered the questions related to the possibility and need for the integration of information technologies into the educational process of the university, changes in content, methods and organizational forms of training using information technologies, as well as the formation of computer literacy skills. It analyzed difficulties in the integration and development of modern information technologies in the university educational system. This is primarily due to the fact that when using information technologies for each subject area of the educational process, it can coincide or differ significantly in individual components. For the successful integration of information and communication technologies, it was necessary to maximize the extension in the free access of open educational resources. The solution to this problem was due to the setting of several problems. The first task was related to the creation of tools to support the needs of the educational process. The second task was the development and creation of educational material in which, in addition to information filling (lecture material), it is important to provide students with laboratory work and tasks for teaching students to practical skills.

Based on the above, we came to the following conclusions: in the implementation of knowledge integration through the use of new information technology, there were some changes in the teacher's activities. The content of education (informative service), the classroom and extra-curricular, motivation and control activities (organizational activities), relationship between the teacher and the student (communication services) have changed.

As a result of our research new opportunities were created to analyze the results of educational activities (progressive services). In this case the teacher's performance in the framework of new information technology, the methodological support of the learning process requires the appropriate level of training. In particular, the general methodological issue of integration of students' knowledge depends on the level of academic areas. Thus, we have made sure that the integration process is one of the main conditions for the effectiveness of the process of readiness to use the teacher's computer technology.

The results of the experimental work for integration of university students' knowledge through new information technologies have learned that students can learn the integrated

educational material through new information technology equipment, understand the importance of education and can use it independently. Computer software products assembled during the experimental work have brought significant changes in the organization of the university educational process.

Integration of students' knowledge through new information technologies resulted to learn how to search for additional information when preparing for lessons, to prepare visual aids and tasks, to follow time saving, to evaluate objectively students' knowledge, to acquire information competence, to plan their skills and coordinate one's behavior, to work independently and in pairs. Students' independent work was organized on the basis of interactive communication through information technology.

Therefore, it is impossible to cover deeply all areas of the issue studied. In improving the educational process of the university, we offered a possible option to address the problem, such as the use of information technology, as integrating the knowledge of students. In our research, we believe that the identified aspects can be the basis for the study of issues of training in the field of general education, high schools in order to implement these problems.

The results of the study show that the student can read the e-learning material, complete the task and read it immediately. The use of new information technologies has allowed students to feel themselves as individuals and increase responsibility. The importance of interactive lessons has been beneficial for both teachers and students. In case when interactive communication was not available, information technology was used as a means of demonstration or a visual aid. Thus, the possibility of integrating knowledge through new information technologies was determined and made sure that it will give a positive result.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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ON THE EFFECTIVENESS OF USING AN ELECTRONIC TEXTBOOK IN FORMING THE READINESS OF FUTURE PRIMARY TEACHERS FOR INTEGRATED LEARNING

Abstract: The article presents a theoretical review and experimental study of the problem of using an electronic textbook in the process of developing the readiness of primary education teachers for integrated learning. The aim of the article is to determine the effectiveness of the electronic textbook in the process of developing the readiness of future teachers for the integrated education of primary schoolchildren.

The research materials were tested during the 2023-2024 academic year on the basis of the Pavlodar Pedagogical University named after Alkey Margulan, where 78 students of the educational program "Pedagogy and Methods of Primary Education" were involved at the stage of testing and implementation of the electronic textbook. To achieve the goal of the study, theoretical (analysis, synthesis, generalization and systematization of scientific publications) and empirical (testing, pedagogical experiment, expert assessment) methods were used. The validity of the results of experimental pedagogical work was confirmed using the methods of mathematical statistics - the Pearson criterion.

The educational results of the participants in the experimental pedagogical work demonstrated the obvious effectiveness and significance of the developed and tested electronic textbook, the content of which ensured the completeness and systematic assimilation of theoretical knowledge and the development of practical skills of students in the educational program "Pedagogy and Methods of Primary Education" for the successful implementation of integrated education for junior schoolchildren.

Keywords: integration, integrated learning, electronic textbook, readiness of future primary school teachers, digital resources in teaching, integrated learning for primary schoolchildren.

Introduction

For the first time in the field of higher education, the demand for electronic learning tools increased during the COVID-19 pandemic, when physical access to many libraries was sharply limited and in these conditions electronic books, textbooks and other educational materials on electronic media acquired the importance of the first necessity, providing access to educational resources (Wells D., & Sallenbach A., 2023). Along with this, the universal digitalization of education aimed at using applications, programs and other digital learning tools in schools, universities, distance learning courses has become particularly relevant, and as a result, electronic educational resources and automated learning systems have become in demand, which can be used at every stage of education at the university, orienting teachers to flexibly build the learning process.

Within the framework of the problem under study, the key concept is “electronic textbook”, which is defined:

- as an electronic digital resource that allows you to increase the effectiveness of learning, using text, hyperlinks with tasks, audio files, educational video files (Ovchinnikova, 2023);

- as a specific system that contains educational information specially selected according to the appropriate structure, training and control exercises aimed at updating, comprehending, memorizing material, which are implemented through computer programs (Ovsjannikova, 2022);

- as software created at a high methodological level, fully consistent with the work program of the discipline (Germanovich, 2021).

Analysis of various approaches to defining the essence of the concept of “electronic textbook” made it possible to identify its practice-oriented orientation, which is manifested in the fact that students, after successfully mastering the content of the theoretical part of the electronic textbook, can work on the acquired knowledge and skills in its practical part.

The relevance of using an electronic textbook in the process of developing the readiness of primary education teachers for integrated learning lies in the social need to improve the quality of education and the development of intellectual abilities of students in the modern information community. The search for directions for increasing the effectiveness of professional development of future primary school teachers’ readiness for integrated learning is due to various educational and digital trends, the transition from a model of knowledge accumulation to a model of continuous use of knowledge. The use of an electronic textbook in the educational process of a university promotes the active use of digital education opportunities.

Let us turn to the available modern foreign works on the research problem. Thus, in the work of (Reinhold et.al, 2020), it is noted that the use of an electronic textbook contributes to a better and more systematic performance of academic tasks, namely, about 20% of teaching time is saved than with the traditional use of lesson form. By saving time, there is a real opportunity to increase the density of the lesson and enrich it with new content.

As studies by American scientists (Rockinson-Szapkiw et.al, 2013) show, the use of electronic textbooks in teaching can reduce the use of paper materials, which in turn contributes to the conservation of natural resources and environmental sustainability in the world.

Researchers (Alhammad et.al, 2019) note that electronic textbooks contribute to the development of information literacy, activate the learning process, and are an effective teaching tool at any stage of the lesson, helping the teacher make the lesson more interesting, accessible and effective.

Researchers (Kudumovic et.al, 2018) believe that the use of electronic textbooks in teaching can lead to revolutionary changes in education and its further development. According to scientists, electronic textbooks have ample opportunities for individualizing learning, allow you to adapt the material to the student’s level of preparation, and provide additional materials and tasks to expand knowledge and skills. Thus, each teacher can work at his own pace and at his own level, increasing his readiness for future professional activities.

Researcher (Vorotnykova, 2019) agrees with this same point of view, she has determined the organizational, psychological and pedagogical conditions for the use of electronic textbooks in school, these include:

- organization of lesson activities based on digital educational resources;
- training teaching staff to use elements of e-learning;
- motivational support for students;
- feedback.

All these conditions are interdependent for the effective use of electronic textbooks in educational institutions, create a favorable educational environment, develop information and

communication skills of students and improve the quality of education.

In (Tlili et.al, 2022) presents the results of the study, which showed that the development and implementation of e-textbooks varies among countries, which requires increased international cooperation to facilitate the implementation of e-textbooks throughout the world. In addition, the authors identified shortcomings in the use of electronic textbooks in education, such as eye fatigue and lack of knowledge about the use of electronic textbooks in education among both students and teachers. Therefore, the authors suggest more strategies for designing and teaching the use of electronic textbooks to improve both teaching and learning experience.

The study by (Shalgimbekova et.al, 2024) notes that the quality and performance of students is influenced by the choice of teaching tool. The authors conducted a quasi-experimental study in which the advantages of an electronic textbook were identified that positively affect the development of students:

- multimedia elements (video, audio, animation) help to better assimilate material due to the involvement of different sensory channels;
- the ability to adapt educational materials to the individual needs and level of training of each student;
- the ability to quickly search for information for an in-depth study of a topic.

It should be noted that digital technologies are used in almost all areas of educational activity, performing a wide range of tasks. Thus, in the work of researchers (Ongarbayev et.al, 2021) considers the problem of developing electronic educational resources. The authors believe that an important part of the training of future teachers is practical exercises, during which students can directly create their own electronic educational resources. This allows them to apply the acquired knowledge in practice, test their skills and evaluate the effectiveness of the educational materials they create.

An electronic textbook is not an alternative, but rather serves as an addition to various forms of lessons (Phan et.al., 2020). A number of American scientists (Chavali et.al., 2022) note that electronic textbooks are becoming popular among students at all levels of education, especially at the university level. Scientists have determined that electronic textbooks make it possible to adapt the material to the individual needs and capabilities of each student. This resource can provide additional information, highlight key concepts, or offer additional tasks for students of different skill levels. This helps to maintain an individual approach to each student and helps to overcome the difficulties encountered in the learning process.

We find an analysis of electronic textbooks as a means of modern education in the study of Kyrgyz scientists (Zulpukarova et.al., 2022) who emphasize the importance of electronic textbooks that can be used at the following stages of a lesson at a university:

- when studying new material;
- at the stage of consolidating and generalizing the acquired knowledge;
- independent study of theoretical material and development of practical skills.

The authors examined the capabilities of digital tools such as: “TurboSite”, “SunRav BookEditor”, “Flipsnack”, with the help of which you can create electronic manuals of any complexity with graphic and video capabilities.

Thus, the research results significantly complement and expand knowledge about the use of electronic textbooks in the educational process of a university, providing students with access to information and interactive materials.

Let us analyze the identified problem in modern Kazakhstani studies. In the context of informatization of education, one of the means of individualizing the educational activities of students at a university is the use of active digital tools (Seri, 2020). The effectiveness of this process depends on digital educational content, including electronic textbooks. The study by (Tazhigulova et.al., 2019) studied the trends in the development of electronic textbooks, presented the results of their implementation in real school practice, and also revealed their

effectiveness. The authors believe that the trend in the development of digital educational content in Kazakhstan and abroad is sustainable, which corresponds to the challenges of media education.

It should be noted that modern electronic learning technologies create a favorable environment for the development of students' cognitive processes. Within the framework of government programs, the use of electronic textbooks is regulated and special platforms for online learning are created (Samuratova, 2023).

Researchers (Seitnur et.al., 2022) reviewed the stages and process of developing an electronic textbook with animation; according to the results of their work, electronic textbooks contribute to better assimilation of educational material, increase interest in learning and develop research abilities in students. The results of the research of the above-mentioned scientists allow teachers to improve the methods and forms of presentation of educational material and demonstrate complex elements of learning in the form of animation.

Summarizing the experience of scientists on the research problem, we came to the conclusion that electronic textbooks provide an opportunity to individualize the educational process, adapting materials to the needs of specific groups of students. In addition, teachers can track progress and evaluate student performance using special functions of electronic textbooks. It should be noted that electronic textbooks cannot completely replace traditional teaching, being only a tool that complements the classical educational process; therefore, it is important to implement an integrated approach, combining various methods and teaching aids.

The problem of our research is to identify the influence of electronic means and determine the effectiveness of the electronic textbook in the process of developing the readiness of future primary school teachers for integrated learning. The solution to this problem was reflected in the development of an electronic textbook and testing its effectiveness in the process of developing the readiness of future teachers for integrated learning in primary school.

Purpose and objectives of the study

The purpose of the study was to determine the effectiveness of using an electronic textbook in shaping the readiness of future teachers for integrated learning in primary school.
The implementation of the designated goal involves solving the following tasks:
1) Analysis of scientific literature on the problem of using an electronic textbook in the pedagogical process of educational institutions.
2) Development, implementation and testing of the electronic textbook "Implementation of an integrated approach in teaching junior schoolchildren".
3) Experimental verification of the effectiveness of using an electronic textbook in shaping students' readiness to implement integrated learning in primary schools.
4) Comparison of the results of perception of educational information on integrated education for primary schoolchildren from traditional and electronic textbooks.

The objectives of the research are implemented in the content of university training of students, therefore there is a need to form a hypothesis:

1) According to the null hypothesis (H0), the distribution of levels of readiness of future teachers for integrated learning in primary school in the control and experimental groups does not differ at the control stage of the experiment.

2) The alternative hypothesis (H1) assumes the presence of positive changes in the levels of readiness of future teachers for integrated learning in primary school in the control and experimental groups, at the control stage of experimental teaching work, since students will be involved in activities aimed at mastering the body of knowledge, skills of integrating scientific knowledge in teaching primary schoolchildren.

Methods and organization of the study

To achieve the research goal, the following methods were used:

- theoretical (analysis, synthesis, generalization and systematization of scientific publications);
- empirical (testing, pedagogical experiment, expert assessment).

Experimental pedagogical work was carried out during the 2023-2024 academic year at Pavlodar Pedagogical University named after. A. Margulan. Using a random sampling method, two groups were formed: control and experimental. At the first stage, the sample consisted of 32 students, at the second stage - 46 students of the educational program "Pedagogy and Methods of Primary Education". The total sample size was 78 students, dual form of education.

The validity of the research results was confirmed using the method of mathematical data statistics - the Pearson criterion. To determine the level of readiness of future primary school teachers for integrated learning, student testing was used, the content of which was developed on the basis of research by (Sukharevskaya, 2013).

The level of preparedness of future primary school teachers for integrated learning was measured using the expert assessment method.

Results and Discussion

In order to form theoretical knowledge and develop practice-oriented skills in organizing integrated education in primary school, we created and tested an electronic textbook for future primary school teachers "Implementation of an integrated approach in teaching junior schoolchildren", for which we received a certificate of entry of information in the state register of rights to objects protected by copyright.

The electronic textbook "Implementation of an integrated approach in teaching junior schoolchildren" was created in the Macromedia Flash 8 development environment, which was used to create interactive web applications that allow the creation of multimedia content.

ActionScript is a programming language that was used to write scripts and create interactive elements in Flash. It made it possible to control animation, handle user events, and interact with server applications.

The use of these technologies to create an electronic textbook allowed:

- use animations to visually represent complex tasks in training;
- use audio and video materials, which contributed to the variety of presentation of educational material;
- use interactive elements of the electronic textbook to provide feedback to students;
- use flash materials on various devices and operating systems, which makes the learning process accessible to a larger number of students.

Thus, the use of Action Script and Macromedia Flash 8 technologies when creating the electronic textbook "Implementation of an integrated approach in teaching junior schoolchildren" contributes to better assimilation of educational materials related to integrated teaching of primary schoolchildren, making learning more interactive, accessible and effective.

The electronic textbook was prepared in accordance with the current educational program "Pedagogy and Methods of Primary Education" of the Pavlodar Pedagogical University named after A.Margulan, which corresponds to the calendar-thematic plan of the discipline "Features of the organization of integrated education in primary school."

This electronic textbook consists of two parts, the content of which is covered in extensive 8 topics. When studying the educational material of the topic, students are presented with practical tasks and literary sources. Each topic of the electronic textbook reflects aspects of integrated learning in primary school; in case of successful mastery of knowledge, skills and abilities for its implementation, positive results will be achieved in the formation of the process

of readiness of future teachers to carry out the pedagogical process of primary school on an integrative basis.

Thus, when considering the first topic, students study the State Educational Standard of Education of the Republic of Kazakhstan, Standard curricula and programs for general education subjects at the primary education level and other regulatory documents that ensure the implementation of an integrated approach in teaching primary schoolchildren. The result of studying this topic is knowledge about state documents on the basis of which integrated learning is carried out in the primary education system.

–As part of the study of the next topic, students consider concepts, characteristics of integration in learning; stages of development of integration in education. The basic principles in the theory of integration were the laws of dialectics about the relationship between parts and the whole, such an understanding of integrity, which is irreducible to a simple sum of parts and is understood as the interpenetration of parts of one whole. The results of studying this topic are:

–knowledge of integration processes in pedagogical theory and practice;

–knowledge about stages, classifications, types and forms, integrative concepts in education.

The third topic, "Specifics of implementing an integrated approach to teaching primary schoolchildren abroad," provides information about the Finnish school education system; The issue of integrated education in the Republic of Korea and Australia was considered. The results of studying this topic are:

- knowledge of regulatory documents governing integrated learning in primary education in Korea, Finland and Australia;
- knowledge about the features of the integrated approach in foreign countries;
- knowledge of the content, stages of integrated education for junior schoolchildren in Korea, Finland and Australia.
- When studying the next topic, "Tools for integrating educational areas in the content of primary education," students receive information about the mechanisms, methods, levels, functions, and principles of pedagogical integration in the education of primary schoolchildren. The results of studying this topic are:
- knowledge about the process of creating connections of a single whole, carried out by merging elements of several areas from other disciplines in one integrated educational subject; merging the foundations of science in revealing interdisciplinary educational problems of primary education;
- practical skills in different ways (subordination, gluing connections, blurring, concentration) to integrate scientific knowledge from different subject areas of primary education.
- In the topic being studied, "Practical tasks for creating an integrated lesson plan," students consider information about the necessary conditions for planning a short-term lesson plan; on pedagogical requirements for the development and implementation of an integrated lesson in primary school. The results of studying this topic are:
- knowledge about techniques, methods and technologies that are used in an integrated lesson;
- knowledge, skills and abilities to design an integrated lesson.
- When studying the following topic, "Layer-shaped form of organizing the content of an integrated lesson," future teachers consider the features of the structure, the analysis scheme of an integrated lesson, and analyze the layer-like form of organizing the content of the lesson.

The results of studying this topic are:

– knowledge of the features of the layer-like form of organizing the content of an integrated lesson in primary school;

– abilities and skills to determine integrated educational areas of academic subjects;

– the ability to determine forms, methods, and means of combining scientific knowledge in teaching primary schoolchildren, which contribute to the effective solution of the goals of an integrated lesson.

While studying the topic "Spiral form of organizing the content of an integrated lesson in Science in grade 1," future primary education teachers consider the features of the spiral form of organizing the content of an integrated lesson. The results of teaching the topic are:

–knowledge of the principle of concentricity, expressed in the gradual increase and complication of content, methods of learning for primary schoolchildren;

–skills and abilities to design a lesson based on the spiral form of organizing the content of primary education, taking into account the features and specifics of this form.

–The next topic of the electronic textbook, "An interpenetrating form of organizing the content of an integrated lesson," reveals the characteristics and features of the interpenetrating form of a lesson based on the integration and interdisciplinary knowledge in teaching primary schoolchildren. The main learning outcomes after studying this topic are:

–knowledge of the specifics of the interpenetrating form of an integrated lesson;

–the ability to switch the attention of primary schoolchildren from one type of activity to another (from plot-role-playing to didactic, then to construction-constructive, theatrical, etc.);

–skills and abilities to construct a lesson based on an interpenetrating form of organizing the content of primary education.

All topics of the electronic textbook are logically interconnected and contribute to broadening the horizons of students, enriching knowledge and developing professional skills.

– Practical assignments on the topics studied in the electronic textbook are designed to practice acquired knowledge and contribute to:

– deepening knowledge about the integration of educational areas in the content of primary education;

– formation of theoretical foundations for the implementation of an integrated approach in teaching children of primary school age;

– systematization of knowledge, skills and abilities of technological integration of educational material for primary school students;

– development of skills and abilities in developing an integrated lesson in primary school;

– expanding existing knowledge about the forms of organizing the content of an integrated lesson in primary school.

The content of the electronic textbook "Implementation of an integrated approach in teaching junior schoolchildren" is one of the tools for developing students' readiness for integrated training of junior schoolchildren, which contributes to a consistent and multifaceted disclosure of the studied processes of pedagogical integration.

The experimental testing of the electronic textbook consisted of three stages (ascertaining, formative, control). In the structure of future teachers' readiness for integrated learning in primary school, we have identified the following components: motivational-value, cognitive, activity. Next, we identified the characteristic features of high, medium, and low levels of formation of the desired readiness.

The high level of students' readiness to implement integrated learning in primary school is characterized by an active interest in their future profession and in the use of an electronic textbook; the presence of knowledge, skills and abilities to integrate scientific knowledge in teaching primary schoolchildren.

The average level of students' readiness to implement integrated learning in primary school is characterized by insignificant interest in their future profession and in using an electronic textbook; students have insufficient knowledge, and skills are superficial.

The low level of students' readiness to implement integrated learning in primary school is characterized by a lack of interest in their future profession and in the use of an electronic textbook; future teachers do not have the necessary knowledge, and the skills and abilities of integrating scientific knowledge are formed at an elementary level.

At the ascertaining stage of the experiment, we tested students in order to assess the initial state of readiness of future primary education teachers to implement integrated learning. The test tasks were compiled based on the research of (Sukharevskaya, 2013). Here are some answers to testing questions.

So, for example, to the question: "What is integrated learning in primary school?"

– 14.1% of the studied students responded that integrated learning consists of combining educational material, thematically repeated in different years of study at different levels of complexity;

– 78.2% of the students surveyed were unable to give a substantiated answer;

– 7.7% of respondents answered that integrated learning consists of combining similar material from different academic disciplines.

To the question: "What is the role of cross-cutting sections and topics in integrated learning?"

– 3.4% of students responded that cross-cutting sections and topics contribute to the implementation of interdisciplinary connections, with the help of which junior schoolchildren repeat and build up educational material throughout the entire period of study;

– 18.7% of respondents believe that cross-cutting sections and topics are the system-forming basis of the content of primary education;

– 77.9% of the students surveyed responded that they could not determine the role of cross-cutting sections and topics in integrated learning.

To the question: "Is the principle of spiraling important for integrated learning?" students formulated their answers as follows:

– 54.4% responded that this principle does not play a special role in integrated learning;

– 40.1% indicated that the principle of spiraling is key when designing an integrated lesson;

– 5.5% responded that the principle of spiraling is important for integrated learning, since the content of primary education is expanded and enriched with new components, with the deepening of existing knowledge.

To the next question "What are the features of integrated education for primary schoolchildren?":

– 7.7% of the surveyed students noted the importance of applying or using the principle of spiraling, pedagogical goal setting, cross-cutting topics and sections in the content of primary education;

– 53.7% of students responded with vague ideas about the features of learning based on the integration of scientific knowledge;

– for the remaining 38.6% of the students, only initial ideas about integrated education for primary schoolchildren were found in their answers.

To the question "How do you assess your level of preparedness for integrated learning in primary school?" we received the following responses:

– 67.3% of respondents noted that existing training at the university does not fully contribute to professional and pedagogical readiness in this direction, innovations are needed in the form of educational and digital training courses;

– 20.2% of students are satisfied with the level of preparation for integrated education in primary school;

- and only 12.5% of respondents have knowledge about the principles, patterns, and means of integrated education for primary schoolchildren, but believe that they are not sufficiently prepared for the practical implementation of this type of education.

The test results showed changes in the experimental and control groups, which are presented in Table 1.

Table 1

Levels of readiness of future teachers for integrated teaching of junior schoolchildren before the introduction of an electronic textbook (in%)

Readiness levels	Experimental group (EG)	Control group (CG)
Low	50,7	56,1
Medium	39,9	34,9
High	9,4	9,0

Analysis of the results of Table 1 indicates that in the control and experimental groups students with a low level of readiness for integrated learning predominate (50.7% in the EG and 56.1% in the CG). This is due to the insufficient development of knowledge about integrated learning, which directly affected the development of skills and abilities to apply them in the educational process of primary school during the period of industrial and teaching practice.

To increase the levels of formation of the required readiness, at the stage of the formative experiment we tested the electronic textbook “Implementation of an integrated approach in teaching primary schoolchildren,” the content of which included topics and tasks that contributed to increasing the levels of the studied readiness of future primary education teachers.

At the stage of the control experiment, we conducted a final test of students using the online service for organizing test tasks - “socrative.com”, identified the levels of learning outcome, and also determined the effectiveness of the developed electronic textbook. The results are presented in Table 2.

Table 2

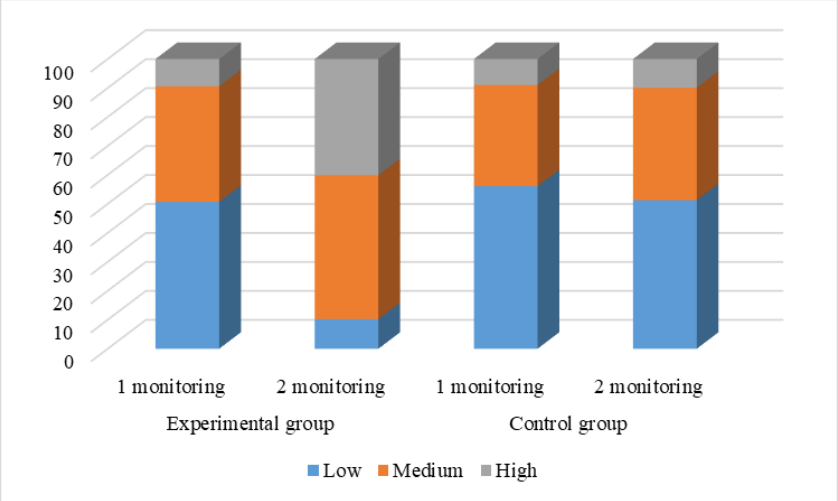
Results of the readiness of future teachers for integrated teaching of junior schoolchildren after testing the electronic textbook (in%)

Readiness levels	Experimental group		Control group	
	1 monitoring	2 monitoring	1 monitoring	2 monitoring
Low	50,7	10,2	56,1	51,3
Medium	39,9	49,7	34,9	38,8
High	9,4	40,1	9,0	9,9

The results of statistical processing of data from the control stage of the study showed a positive trend in the levels of readiness of students in the experimental group from 9.4% to 40.1%, and in the control group there was no positive increase in students’ readiness levels, since the electronic textbook was not tested in this group (Fig. 1).

Figure 1

Results of the readiness of future teachers for integrated teaching of junior schoolchildren (after testing the electronic textbook)



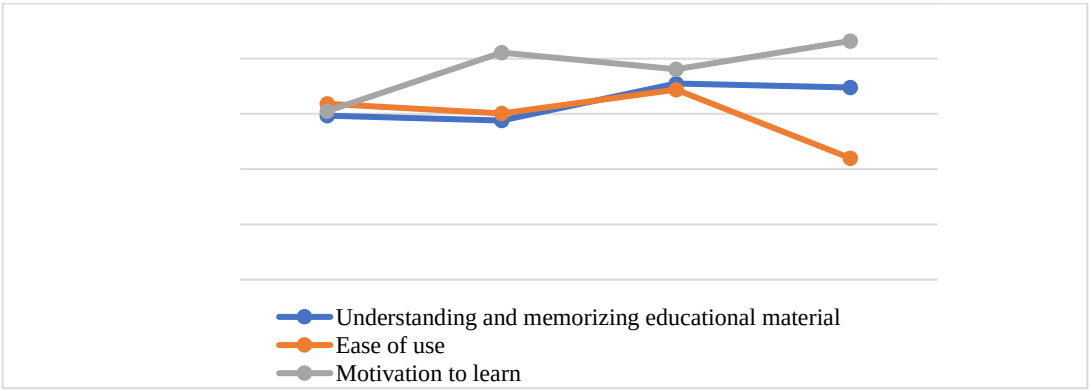
The implementation of the fourth objective of the study involved a comparative analysis of the perception of educational information on integrated education for primary schoolchildren from traditional and electronic textbooks. To do this, we used a traditional printed textbook (Kalimova, 2024) and the developed electronic textbook. Students were encouraged to explore topics from the learning resources provided. We have defined the following criteria for information perception:

- understanding and remembering educational material;
- ease of use;
- motivation to learn.

After studying the educational material from the proposed resources, students passed a survey. Analysis of the survey results allows us to assert that students of the educational program "Pedagogy and methods of primary education" better perceive and remember educational information posted in the electronic textbook. The results of a comparative analysis of the perception of educational information on integrated education for junior schoolchildren from traditional and electronic textbooks are presented in Figure 2.

Figure 2

Results of a comparative analysis of the perception of educational information on integrated education for primary schoolchildren from traditional and electronic textbooks



The diagram shows that 35.5% of students better understand and remember educational material from an electronic textbook, while the perception and understanding of similar material from a traditional textbook among these students was 29.7%. This confirms our assertion that electronic textbooks are more effectively used for understanding and memorizing in the practice of implementing an integrated approach to teaching primary schoolchildren and using the technology of pedagogical integration of scientific knowledge. The multimedia content of the electronic textbook allows to show to students in a flexible manner the connection between knowledge from individual fields of science and the need to study it at the intersection of traditional primary school subjects.

Analysis of the results for the second criterion shows that ease of use is one of the key advantages of electronic textbooks. The average percentage of the "ease of use" criterion of an electronic textbook in the experimental group (EG) is 34.4%, which is higher compared to a traditional textbook in the EG, where this figure is 31.8%, indicating a clear advantage of an electronic textbook that includes interactive elements, such as animations, audio, video and tests that promote ease of use.

The results of the data for the third criterion showed that motivation to learn plays an important role in the effectiveness of educational materials, so 38.5% of students noted that the electronic textbook contributes to a higher level of motivation to learn. This is due to the variety of interactive features that the electronic textbook contains, such as interactive tasks and the ability to receive instant feedback. The remaining 30.1% of students believe that a traditional textbook has an advantage over an electronic one, due to the provision of a physical sensation of the book and safety for vision.

Thus, the results of the comparative analysis indicate that, in general, electronic textbooks can significantly improve students' perception of information compared to traditional textbooks. However, traditional textbooks still have value and may be preferable in certain circumstances. It is important to find a balance between the use of electronic and traditional textbooks to provide a learning environment for each student, taking into account their individual needs and preferences. This may involve combining both types of learning resources to create a comprehensive and flexible learning environment.

To check the statistical data of the experimental groups, we used the Pearson test (x^2), which allowed us to assess the significance of the differences between the actual and identified characteristics of the samples. For this purpose, the null and alternative hypotheses were formulated.

According to the null hypothesis (H_0), the distribution of levels of readiness of future teachers for integrated learning in primary school in the control and experimental groups *does not differ* at the control stage of the experiment.

The alternative hypothesis (H_1) assumes *the presence of positive changes* in the levels of readiness of future teachers for integrated learning in primary school in the control and experimental groups, at the final stage of experimental teaching work.

As a result of pairwise comparison, the alternative hypothesis was confirmed – $x^2_{emp.} > x^2_{cr.}$ (p 0.05) (Table 3).

Table 3

Changes in the levels of readiness of future teachers for integrated education of junior schoolchildren (%)

Sample	**Levels**			$x^2_{emp.}$	$x^2_{cr.}$
	low	**medium**	**high**		
CG	51,3	38,8	9,9	60,8	5,74
EG	10,2	49,7	40,1		

A comparative analysis of the research results showed that at the control stage of the experiment, the levels of readiness differed significantly in the EG and CG, which proved the effectiveness of the influence of the electronic textbook we developed on the formation of the readiness of future teachers for integrated learning in primary school.

Further in the study, we applied the method of expert assessments, which consists in attracting competent people, which allows us to objectively assess the effectiveness of the electronic textbook we developed. The purpose of the examination is to determine the effectiveness of the influence of the electronic textbook on the formation of the readiness of future teachers for integrated learning in primary school. The peer review process involved 3 independent experts in their professional activities. The collection of expert opinions was carried out through a questionnaire survey. The criteria for determining the effectiveness of the electronic textbook "Implementation of an integrated approach in teaching primary schoolchildren" were the following:

– expansion of professional interests and motivation among students of the educational program "Pedagogy and Methods of Primary Education" to implement integrated learning;

– orientation of future primary education teachers towards the long-term perspective of their activities;

– increasing the level of readiness of future primary school teachers for integrated learning.

By comparing the responses of the experts to the questionnaire, we came to the conclusion that developing the readiness of future teachers for integrated teaching of junior schoolchildren is a labor-intensive process that requires systematic work throughout the entire period of study in a higher education organization. The use of the electronic textbook "Implementation of an integrated approach in teaching primary schoolchildren" contributed to the generalization of students' theoretical knowledge about the features of pedagogical integration, the essence of integrated learning, algorithms and mechanisms of pedagogical integration, methods of combining the content of educational areas of primary education, the use of layer-like, spiral, interpenetrating forms in the development integrated lessons and more. The use of practice-oriented tasks included in the content of the electronic textbook has significantly expanded the scope of their use in the process of developing integrated lessons and exercises.

In general, the results of the experimental work convincingly indicate positive changes in the indicators of the formation of future teachers' readiness for integrated teaching of primary schoolchildren. Analysis of the research results shows that the number of students in the experimental and control groups who were at a low level of readiness decreased by 41.4% and 29.9%, respectively. Consequently, the positive dynamics of the results of shaping the readiness of future teachers for integrated teaching of primary schoolchildren confirms the effectiveness of the developed electronic textbook.

Conclusion

Electronic textbooks are being widely introduced into the practice of higher education

teachers, especially after the active use of distance technologies during the pandemic. Our research confirms that the use of the electronic textbook we developed contributes to the effective formation of the required readiness of students, and the significance is determined by its effectiveness and is expressed in the completeness, systematic assimilation of theoretical knowledge and the development of pedagogical skills in combining scientific knowledge.

It should be noted that the electronic textbook is not a replacement for a qualified teacher. Despite all its advantages, it cannot replace personal contact, and its "intellectual" capabilities are incomparable with human ones. At the same time, the content of the electronic textbook "Implementation of an integrated approach in teaching primary schoolchildren" ensures the effective formation of the required readiness and can be used as one of the elements of the practical component of the process of preparing primary education teachers for integrated education.

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Conflict of Interest Statement

Conflict of Interest Statement The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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SURVEYING METHODOLOGICAL COMPETENCE IN COMPUTER SCIENCE: IMPLICATIONS FOR PROFESSIONAL GROWTH

Abstract. In the contemporary landscape, characterized by widespread informatization, including in education, there is a growing need for both fundamental and applied training in leveraging information and communication technologies (ICT). This article explores how enhancing the methodological competence of computer science educators impacts the development of students' key competencies. Given the high societal demand for well-educated professionals, educational quality is crucial, necessitating rigorous standards.

The article critically analyzes the concepts of "competence" and "competency" from various scholarly perspectives, highlighting the significant role of a teacher's competence in the professional growth of future educators. Practical research focused on developing methodological competence helps students deepen their theoretical understanding, enhance pedagogical skills, and cultivate professional and personal qualities, fostering creativity and independence.

It also identifies trends in teacher education within higher education, considering the effects of a two-tier system and professional teaching standards. The article defines "methodological competence" and "professional competence," noting that despite varying scholarly views, it generally includes theoretical knowledge and practical skills. These competencies enable educators to innovate and apply diverse pedagogical methods, thereby fostering student competencies.

Keywords: Informatization of education, methodological competence, computer science education, pedagogical innovation, educational quality, student competencies

Introduction

The primary objective of teaching computer science in Kazakhstan Higher education, amid the increasing integration of information and telecommunications technology, is to cultivate a scientific worldview and develop students' personal qualities, enabling them to utilize knowledge adaptively in various contexts. Achieving this goal necessitates the continuous professional and methodological development of computer science educators.

The evolution of modern society and advancements in science and culture demand a high level of education, grounded in universal and national values, to prepare culturally sophisticated specialists. The initial computer science curriculum, akin to other foundational subjects, plays a crucial role in the general education of students. The discipline "Information and Communication Technologies" aims to develop computer literacy, logical thinking, algorithmic skills, and systemic problem-solving approaches. It also focuses on familiarizing students with basic computer concepts, including building simple robotic models and programming.

The educational process is goal-oriented, well-organized, and methodologically supported, emphasizing cognitive and educational communication, as well as teacher-student interaction. Educational formats include frontal, collective, group, pair, and individual instruction, with varying student compositions. The frontal form, where all students engage

with the same content and activities, remains valuable in computer science education, employing verbal, visual, and practical methods, including knowledge assessment.

The incorporation of competencies into the educational framework addresses a common issue in secondary education, where students often excel in theoretical knowledge but struggle to apply it in real-world situations. Recent emphasis has been placed on key competencies, though there is no universally accepted definition. Competence is generally understood as the ability to handle diverse tasks. The evolving educational landscape necessitates new competencies for teachers to meet the changing needs and expectations of students.

In this context, two primary groups of competencies are distinguished: general cultural competencies, which include universal educational skills and information competence (encompassing computer literacy, information retrieval, and evaluation, as well as proficiency in communication technologies); and methodological competencies, which are specifically pedagogical and support both individual and group student development (Lapchik et al., 2015)

The development of computer science education in Kazakhstan Higher Education is significantly influenced by the integration of information and telecommunications technologies, aligning with global educational trends. According to recent studies, the infusion of ICT in education not only enhances students' digital literacy but also fosters critical thinking and problem-solving skills, essential for navigating the modern technological landscape (Ifenthaler, 2014).

In Kazakh educational practice, the emphasis on developing a scientific worldview and personal adaptability in students mirrors international educational objectives, highlighting the necessity for continuous professional development of educators (Sharifbaeva et al., 2022). The professional development of teachers, particularly in methodological competencies, is crucial for effectively integrating ICT in the curriculum, as evidenced by research indicating that well-trained teachers significantly impact student outcomes in ICT-related subjects (Law et al., 2008)

The foundational curriculum in computer science, including "Information and Communication Technologies," is pivotal in establishing baseline competencies such as computer literacy, logical reasoning, and algorithmic thinking. This is consistent with international educational standards, which emphasize the early introduction of digital skills to prepare students for advanced technological education (Voogt et al., 2018). The curriculum's focus on hands-on experiences, such as building robotic models, aligns with constructivist educational theories that advocate for experiential learning to enhance understanding and retention (Manolis et al., 2013).

The traditional frontal teaching method, while prevalent, is increasingly complemented by differentiated instructional strategies that address diverse learning needs. Studies suggest that incorporating collaborative and individualized learning approaches can better support students' understanding and application of complex concepts.

The introduction of competencies in education, particularly in the Kazakh context, aims to bridge the gap between theoretical knowledge and practical application. The emphasis on key competencies, including information and methodological competencies, reflects a broader educational shift towards preparing students for real-world challenges. Information competence, which includes skills in digital literacy and critical evaluation of information, is increasingly recognized as essential for navigating the vast amounts of data available in the digital age (Rychen & Salganik,2003).

Methodological competencies, focusing on pedagogical skills that support individual and group learning, are critical for fostering a supportive and effective learning environment. Research underscores the importance of these competencies in enhancing student engagement and promoting deeper learning (Hattie, 2003).

These insights underscore the importance of aligning educational practices with contemporary pedagogical theories and the evolving demands of the digital age, particularly in the context of Kazakh secondary education. The ongoing development of educators' competencies, both in terms of content knowledge and pedagogical skills, is vital for ensuring the relevance and effectiveness of computer science education in preparing students for future challenges.

Methods and organization of the research

To conduct scientific research on the topic "Surveying Methodological Competence in Computer Science: Implications for Professional Growth" a structured approach is essential. This involves defining clear research objectives, choosing appropriate methodologies, gathering data, and analyzing findings.

The development of methodological competence among computer science teachers is a critical factor in enhancing the quality of education in the digital age. As educational institutions increasingly integrate information and communication technologies (ICT) into curricula, the need for teachers to possess advanced methodological skills becomes paramount. This research aims to explore the formation of methodological competence among computer science lecturers in universities, focusing on how they adapt to and incorporate pedagogical technologies and ICT in their teaching practices.

The study involves 48 participants, all of whom are lecturers in university computer science departments. These educators are at the forefront of implementing innovative teaching methods and integrating technology into the classroom, making their experiences and insights invaluable for understanding the current state and future direction of teacher competence in this field. The research seeks to identify key components of methodological competence, assess the effectiveness of professional development programs, and provide recommendations for enhancing the support systems available to these educators.

Research Objectives

1. To identify the key components of methodological competence in computer science education.
2. To assess the current level of methodological competence among computer science teachers.
3. To evaluate the impact of professional development programs on enhancing methodological competence.
4. To explore the relationship between methodological competence and student outcomes in computer science.

Methodology

1. Survey and Data Collection (a survey targeting computer science teachers to assess their self-reported levels of methodological competence).
2. Interviews and Case Studies (interviews with selected teachers and educational administrators to gain qualitative insights).
3. Data Analysis

Survey Results (Quantitative Data)

Target group included 48 computer science lecturers. Age comprised 25-55 years, professional experience 1-30 years. Educational Background included Master's, and Doctorate degrees in related fields

To assess the self-reported levels of methodological competence among computer science teachers, a structured survey was designed and administered. The survey aimed to gather comprehensive data on various aspects of methodological competence, including theoretical knowledge, practical skills, and the application of pedagogical technologies in teaching.

A questionnaire was developed based on a review of existing literature on teacher competence and pedagogical methodologies. The survey included questions on key areas such as curriculum design, instructional strategies, use of ICT, classroom management, and continuous professional development. The questionnaire was pilot tested with a small group of computer science teachers to ensure clarity, relevance, and appropriateness of the questions. Feedback from the pilot test was used to refine the survey instrument.

The target group consisted of 48 computer science lecturers from various universities. These participants were selected based on their active engagement in teaching computer science and their involvement in professional development activities related to ICT. Participants were invited to take part in the survey through official communication channels, including emails and departmental meetings. The purpose of the research, the voluntary nature of participation, and the confidentiality of responses were clearly communicated.

The survey was distributed electronically to all participants. An online survey platform was used to facilitate ease of access and response. Clear instructions were provided at the beginning of the survey, explaining how to complete the questionnaire and the estimated time required (approximately 15-20 minutes). Participants were given two weeks to complete the survey, with reminders sent periodically to encourage participation and completion. The online platform enabled real-time monitoring of responses, ensuring that all data was collected efficiently and securely.

The collected data was analyzed using statistical software to evaluate the self-reported levels of methodological competence. Descriptive statistics, such as mean scores and standard deviations, were calculated for different competence areas. The analysis also included examining the relationships between demographic variables (such as years of teaching experience) and self-reported competence levels.

The anonymity of the participants was maintained throughout the study. Data was stored securely and used solely for research purposes.

The survey results provide valuable insights into the current state of methodological competence among computer science teachers, highlighting areas of strength and potential improvement. These findings are intended to inform future professional development initiatives and educational policy decisions.

Here are some example questions that were included in the survey targeting computer science teachers to assess their self-reported levels of methodological competence:

- Curriculum and Instructional Design: how confident are you in designing a computer science curriculum that aligns with national educational standards? How often do you incorporate real-world problems into your computer science lessons? with possible variants of answer (always, often, sometimes, rarely, never)
- Use of Technology in Teaching: how proficient are you in using educational software and tools to enhance student learning in computer science? with possible variants of answer (highly proficient, proficient, moderately proficient, slightly proficient, not proficient). How frequently do you use online resources (e.g., tutorials, forums, online courses) to update your knowledge and skills in computer science?
- Classroom Management and Student Engagement: How effective are you at managing a classroom with diverse learning needs and technological skills? What strategies do you use to engage students in computer science classes? Professional Development and Continuous Learning: How often do you participate in professional development activities related to computer science education? How valuable do you find professional development workshops and courses for improving your teaching methods?
- Self-Assessment of Methodological Competence: Rate your overall methodological competence in teaching computer science. Which areas do you feel you need further development in?

These questions were designed to cover a wide range of aspects related to methodological competence and provide valuable data for assessing the strengths and areas for improvement among computer science teachers.

Literature review

The methodological competence of a computer science lecturer encompasses the theoretical and practical readiness to teach non-specialist computer science courses in university using contemporary pedagogical technologies. This competence includes a commitment to professional growth and adaptability, and the development of pedagogical qualities within the context of educational informatization.

Pedagogical technology, which differs from traditional didactic systems, plays a crucial role in this framework. It is a systematic model that encompasses all elements of pedagogical actions, including the design, organization, and implementation of the educational process, aimed at optimizing conditions for both students and teachers (Aleksieienko-Lemovska, 2022).

Kazakhstan's educational system aims to elevate the educational standards of the younger generation to international levels, particularly through a national education model. The success and prosperity of the state are believed to depend on nurturing talented individuals, which, in turn, relies on the competence and development of teachers. Competence is defined as the ability to apply acquired knowledge and skills effectively in specific professional contexts, thereby achieving high-quality outcomes.

The concept of competence encompasses several key attributes, including a sense of responsibility, participation in problem-solving, mastery and application of technologies, a positive attitude towards work, and a continuous pursuit of professional growth.

Teaching technology, as an integral part of the didactic and methodological system, involves the implementation of educational content through methodologies and tools that ensure the effective achievement of curricular goals. It includes a structured approach to setting ultimate educational goals, predicting intermediate objectives, relying on robust training content, providing standardized training technologies, and offering methodologies for objective quality assessment. Additionally, it outlines the organizational forms and conditions necessary for effective learning (Mukhatayev et al., 2024)

The algorithm of the educational concept based on the use of teaching technologies is presented as follows:

1. presentation of the ultimate goals of the education system;
2. presentation of forecast indicators of intermediate goals;
3. relying on the content of training;
4. provide a standard training technology that will lead to the intended goal and provide a methodology for objective verification of the quality of training;
5.presentation of organizational forms and conditions of training (Biloshchytskyi et al., 2020)

The distinction between teaching methodology and teaching technology is often debated in pedagogical literature. Methodology generally refers to the comprehensive use of teaching methods and techniques without necessarily considering the individual characteristics of the educator. In contrast, teaching technology is closely linked to the unique qualities and pedagogical skills of the teacher, emphasizing the personalized application of methods in practice (Garcia, 2009).

Teaching technology, therefore, is not merely about the mechanical application of techniques but involves the creative and individualized use of pedagogical skills. This makes it challenging to standardize or manage at a systemic level, as it inherently involves the personal attributes and pedagogical craftsmanship of each educator.

To understand the nuanced application of the terms "technology" and "methodology" in educational contexts, it is crucial to differentiate between these concepts. Teaching technology, when viewed not merely as a pedagogical process but as a structured framework for organizing and implementing educational activities, suggests that it can be utilized by various educators beyond its original creator. This framework includes specific structural components that are designed to meet particular educational goals and objectives, ensuring consistency in application while accommodating individual professional qualities of teachers.

Teaching technology represents an advanced stage of methodological development, often referred to as an "author's teaching methodology." This stage involves a detailed specification of core components by the educator, including the educational goals, design, choice of methods and instructional tools, organization of participant interactions, and mechanisms for assessment and control. The primary aim is to enhance knowledge acquisition, skill development, and flexibility among learners. Consequently, any comprehensive teaching methodology, when refined to this level of detail, attains the status of a technology.

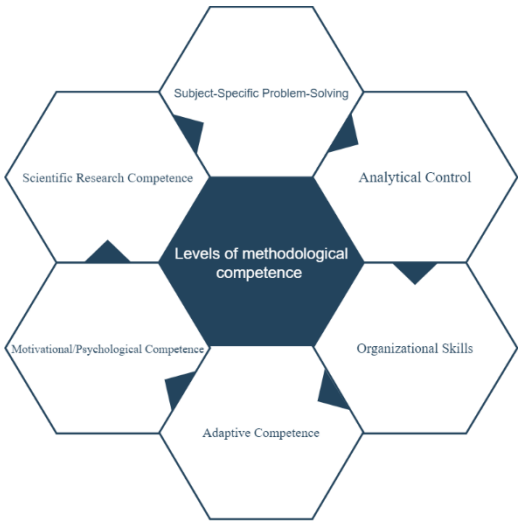
In analyzing the correct use of the terms "technology" and "methodology," the work of A. Khutorsky provides valuable insights. According to Khutorsky, the theory of education bifurcates into general didactics and subject-specific didactics, with the latter tailored to the instruction of particular academic disciplines across educational levels, from early childhood education to higher education (including undergraduate, master's, and doctoral programs). Subject didactics, often synonymous with teaching methods, is pivotal in shaping the instructional approaches within specific academic fields (Khutorskoy, 2003).

From a pedagogical standpoint, the relationship and distinctions between technology and methodology can be summarized as follows: the theory and methodology of teaching computer science encompass pedagogical sciences that focus on the instruction of computer science across various educational stages and the organizational and methodological forms of teaching employed. The methodology of teaching computer science integrates knowledge from pedagogy, psychology, and human physiology, forming a core component in the professional preparation of computer science educators.

A computer science educator must develop several competencies, including information, communicative, self-management, and problem-solving competencies. Information competence involves the proficient use of computer systems and peripheral devices (such as scanners, printers, modems), as well as information and communication technologies (including electronic libraries, email, internet resources, chat rooms, and video conferencing) in educational settings ranging from general secondary schools to specialized institutions like gymnasiums, colleges, and lyceums. This competence is critical for teaching the discipline of "Informatics" effectively.

Communicative competence encompasses a mastery of oral and written communication methods, facilitated through both traditional pedagogical approaches and advanced information and telecommunication technologies. Self-management and problem-solving competencies involve a set of skills and approaches necessary for professional activities, including the integration of scientific research. This includes problem identification, goal setting, resource and activity planning, technology selection, activity evaluation, and the assessment of results. These competencies are crucial for conducting independent, scientifically-based activities using new technologies, particularly in the domains of design, software development, mathematical modeling, and information processing (Romanyuk et al., 2022).

Figure 1
Levels of methodological competence



The formation of methodological competence in future computer science teachers can be delineated across several levels:

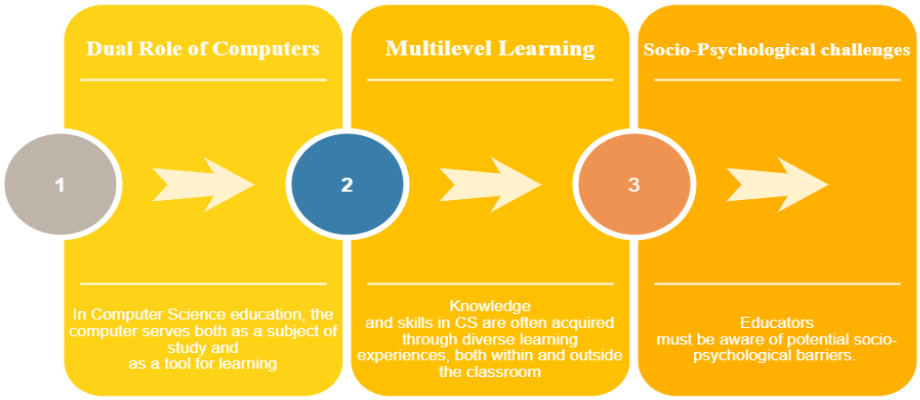
1. Subject-Specific Problem-Solving: this level encompasses the capability to address issues specifically related to the computer science discipline, focusing on the practical application of subject knowledge.
2. Analytical Control: at this level, individuals demonstrate the ability to analyze and monitor subject-related activities, ensuring accuracy and adherence to educational standards.
3. Organizational Skills: this involves the ability to effectively organize one's own teaching activities, including lesson planning, classroom management, and the coordination of educational resources.
4. Adaptive Competence: this level reflects the capacity to adapt teaching methods and strategies in response to evolving circumstances and requirements, ensuring that instructional practices remain relevant and effective.
5. Motivational/Psychological Competence: this dimension encompasses the psychological and personality traits necessary to resolve interpersonal conflicts and maintain a positive learning environment.
6. Scientific Research Competence: this level is characterized by the ability to conduct research on educational practices and outcomes, contributing to the development of the university, academic staff, and students through evidence-based insights (Bygstad et al., 2022).

Computer science, as a distinct academic discipline, began to crystallize in the latter half of the twentieth century. It focuses on the general properties and structure of information, addressing issues related to the processes of searching, collecting, storing, transforming, transmitting, and utilizing information in various human activities. The field's reliance on modern information and telecommunications technologies underscores its material base and fundamental importance (Cherryholmes, 2013).

The unique nature of computer science necessitates a tailored approach to teaching, which may not always align seamlessly with methodologies from other disciplines. Several specific considerations are pertinent:

Figure 2

IT lecturers' methodological competence challenges



- Dual Role of Computers: in computer science education, the computer serves both as a subject of study and as a tool for learning. This dual role requires careful consideration, especially in contexts where students may lack access to computers outside the classroom, impacting homework and self-study opportunities.
- Multilevel Learning: knowledge and skills in computer science are often acquired through diverse learning experiences, both within and outside the classroom. It is crucial to address the integration and continuity of learning across different educational stages and environments.

  Socio-Psychological challenges: Educators must be aware of potential socio-psychological barriers, such as anxiety about damaging equipment or the "computer helplessness" phenomenon, which includes fear of the unfamiliar and a lack of confidence in using technology. These factors can significantly hinder the learning process if not adequately addressed (Vlasenko, 2019).

In general, students are interested in computer science lessons, because the computer itself is an incentive for studying the subject. It is advisable to consider the computer as an object and subject of study.

The created situation involuntarily pushed teachers to change their attitude to the process of introducing information and communication technologies and to take courses on computer literacy first, then on the use of Internet technologies. The introduction of new, promising forms and methods of teaching, education and development of students is always an effective incentive for creative searches of lecturers. The achievement of the educational results indicated in the federal state educational standards directly depends on the methodological competence of the teachers implementing them, and the information literacy of the teacher becomes not only an integral part of the methodological competence, but also one of the main tools of professional growth and competitiveness (Agapov &Mysina, 2022)

It seems that the task of higher education can be considered only the task of forming the foundations of both information competence and information culture of students, which can really be formed in the process of further professional activity in unity with self-education, experience and professional development.

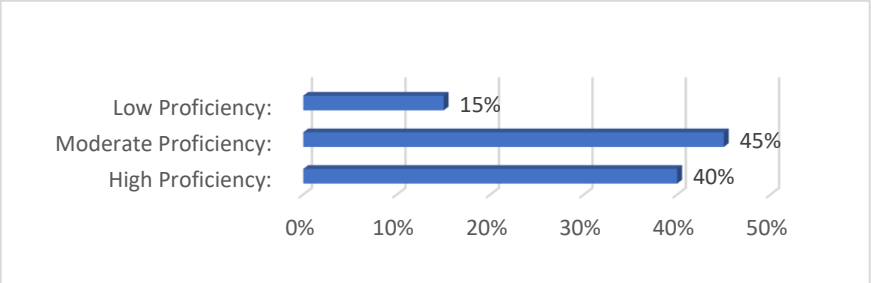
As a conclusion, it should be noted that the competence approach in the information training of teachers cannot be absolutized, because it is known that fundamental education, the experience of which has been accumulated in the education system, has great potential in the development of personality, provides opportunities for the formation of creative experience and abilities.

Research results and their discussion

To present the total results of the survey in percentage form, we will summarize the key areas of the survey based on hypothetical data derived from the responses of the 48 participants. Here's an example of how these results might be presented:

Figure 3

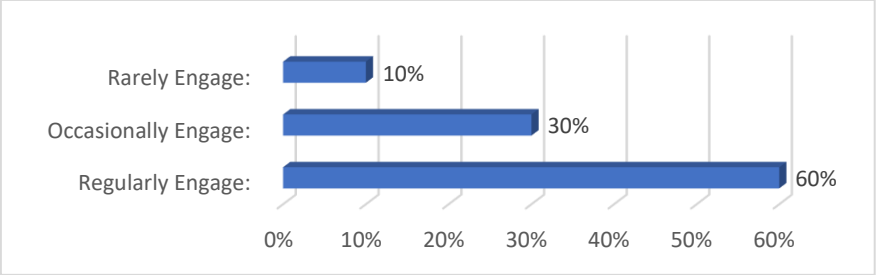
Proficiency in Technology Integration



High Proficiency: 40% (19 teachers)
Moderate Proficiency: 45% (22 teachers)
Low Proficiency: 15% (7 teachers)

Figure 4

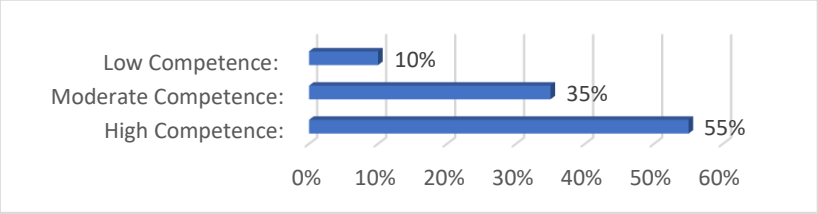
Engagement with Professional Development



Regularly Engage: 60% (29 teachers)
Occasionally Engage: 30% (14 teachers)
Rarely Engage: 10% (5 teachers)

Figure 5

Competence in Communication Skills



- *Knowledge of Pedagogical Theories:*

80% report moderate to high familiarity.
20% report low familiarity.

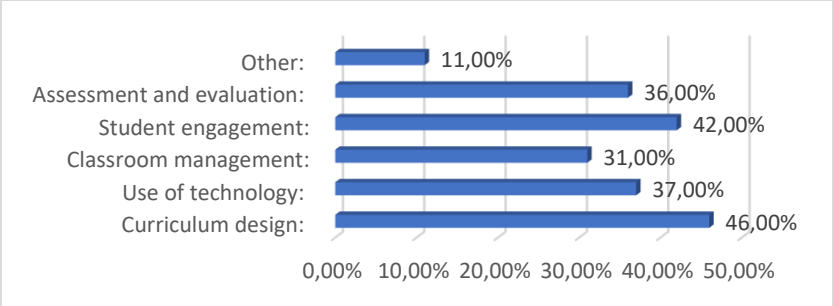
- *Use of ICT in Teaching:*

70% regularly integrate ICT tools into lessons.
30% use ICT tools occasionally.

- *Professional Development:*

60% participate in annual professional development programs.
40% participate less frequently.

Figure 6
Areas Needing Further Development



The survey results reveal a diverse range of experiences, competencies, and challenges among university computer science lecturers. Overall, academic staff exhibit a strong foundation in basic pedagogical skills and a commendable willingness to integrate technology and innovative teaching methods into their curricula. However, certain areas, such as curriculum design, use of technology, classroom management, and student engagement, require further development to enhance the effectiveness of teaching practices and the learning experience for students.

The data indicate that while a significant proportion of teachers feel confident in their abilities, there are still gaps in proficiency, particularly in incorporating real-world problems and maintaining up-to-date professional development. The findings suggest that targeted interventions could help bridge these gaps, fostering a more robust and comprehensive approach to computer science education.

To enhance the methodological competence of university educators, several key recommendations have been identified:

- systematically attend trainings, advanced training courses on the development of professional competencies (for example, on teaching methods, development of educational programs, content of ICT education, management of the educational process, interdisciplinary problems of education), including through online learning;

- constantly develop competencies in the use of ICT tools in planning and organizing the educational process;

- participate in sessions to exchange experiences with colleagues from their university and other universities;

- regularly conduct self-reflection and assessment of their own activities.

By adhering to these recommendations, educators can enhance and sustain their methodological competence, ultimately leading to improved educational outcomes and better preparation of students to meet the demands of the digital era.

The research highlights the importance of methodological competence in enhancing the quality of computer science education. While most teachers possess a moderate level of competence, there is a need for more targeted professional development programs. These programs should focus on the practical application of pedagogical theories and the integration of ICT tools in teaching. Additionally, institutional support and resource allocation are crucial for ongoing professional development.

Conclusion

Students generally exhibit a strong interest in computer science lessons, as the intrinsic appeal of computers acts as a significant motivator for studying the subject. It is pertinent to consider computers both as objects of study and as instruments for learning. This dual

perspective underscores the importance of integrating information and communication technologies (ICT) into the curriculum.

The evolving educational landscape has compelled educators to reassess their approach to the integration of ICT. Initially, this involved basic computer literacy courses, followed by training in the application of internet technologies. The adoption of innovative teaching methods and educational strategies is a potent catalyst for the creative development of educators. Achieving the educational outcomes delineated in federal state educational standards is closely tied to the methodological competence of the teachers responsible for their implementation. In this context, information literacy is not merely a component of methodological competence but emerges as a critical tool for professional development and competitive advantage.

The objective of higher education institutions should not be limited to the foundational development of students' information competence and culture. These competencies are more fully realized through continued professional practice, self-directed learning, and professional development.

In conclusion, while the competency-based approach in the ICT training of teachers is valuable, it should not be viewed as an absolute. The enduring benefits of a robust foundational education, as traditionally emphasized within the education system, remain crucial. This foundation supports the development of individual creativity and the capacity for innovative thinking, which are essential for professional growth and the effective application of ICT in education.

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DEVELOPMENT OF DIGITAL ETIQUETTE FOR EFFECTIVE INTERACTION BETWEEN 1ST YEAR STUDENTS AND TEACHERS: STRATEGIES FOR COOPERATION IN THE ERA OF DIGITALIZATION

Abstract: This article explores the importance of developing digital etiquette for effective interaction between 1st year students and their teacher in the digital age. The article uses a survey method using the Google disk platform, with the help of this research method, the author manages to determine the level of understanding by applicants of the «Concept of digital etiquette». The authors also propose rules of cooperation that will help participants successfully interact in an educational environment where digital technologies are playing an increasingly important role. To fully disclose the concepts of «Digital etiquette», the authors conduct a coaching session for applicants. As part of the research of this article, a literary analysis on the topic under study was carried out.

The authors emphasize that the Internet plays a central role in the daily lives of many people, is used to search for information, watch videos, read news, communicate on social networks and messengers, make purchases, listen to music, play games and communicate via mobile phones, tablets or computers. The article reveals the value and also provides recommendations for improving digital etiquette between students and their teachers, where the key element of successful work in modern education is the online environment.

Keywords: online environment, teacher, applicant, digital etiquette, rules, internet, social networks.

Introduction

People born in the digital age rely heavily on the Internet to access information and interact. According to the report of the innovative digital hub Wonder Digital, more than 17.3 million of the 19.5 million population use the Internet in Kazakhstan, which is approximately 89.2% penetration. According to the portrait of Internet users in Kazakhstan, 48% are men, 52% are women; 41% aged 20 to 41 years, 29% aged 6 to 19 years.

The Internet plays a central role in the daily lives of many people, it is used to search for information, watch videos, read news, communicate on social networks and messengers, make purchases, listen to music, play games and communicate via mobile phones, tablets or computers. Online education contributed to the spread of the Internet among these groups both during and after the COVID-19 pandemic.

Digital etiquette regulates the interaction between users in a digital environment, aimed at maintaining non-aggressive, polite, effective, comfortable and appropriate communication. The origin of digital etiquette is usually associated with the concept of «netiquette», which appeared in the environment of Fidonet echo conferences in the mid-1980s.

This type of etiquette is also known as Internet etiquette or network etiquette. These are not mandatory legal norms, but recommendations on how to behave on the Internet. Digital etiquette is mainly used when communicating with strangers in the online space. The rules of digital etiquette can vary greatly depending on the specific platform and its participants. Usually, the owner of a website or communication application determines the types and

amounts of digital etiquette. They are also responsible for ensuring compliance with these rules and punishing violations of them.

When interacting in an online environment, it is important to remember that communication takes place with real people, not just with devices. Just like in real life, there are certain norms of behavior on the Internet. Therefore, observing network etiquette plays an important role in preventing negative consequences.

However, excessive time spent on the Internet can have a negative impact on health. Insufficient digital literacy and ignorance of the rules of online behavior have led to problems such as cybercrime, cyberbullying, leakage of confidential information and Internet addiction.

The object of the study is students of the 1st year due to the fact that these are those who have just acquired the status of a «university student» and they have at least 4 years of undergraduate studies ahead of them, and good knowledge in the field of digital etiquette is necessary for effective communication with teachers, groupmates, fellow students and the university administration.

The purpose of this study is to identify the level of digital etiquette among 1st-year students, as well as to suggest ways to improve cooperation between students and teachers in the era of digitalization.

Participants. The empirical basis of the study was made up of students of pedagogical and creative specialties of the 1st year of the Abai Kazakh National Pedagogical University and the Kazakh National University of Arts in the amount of 119 students.

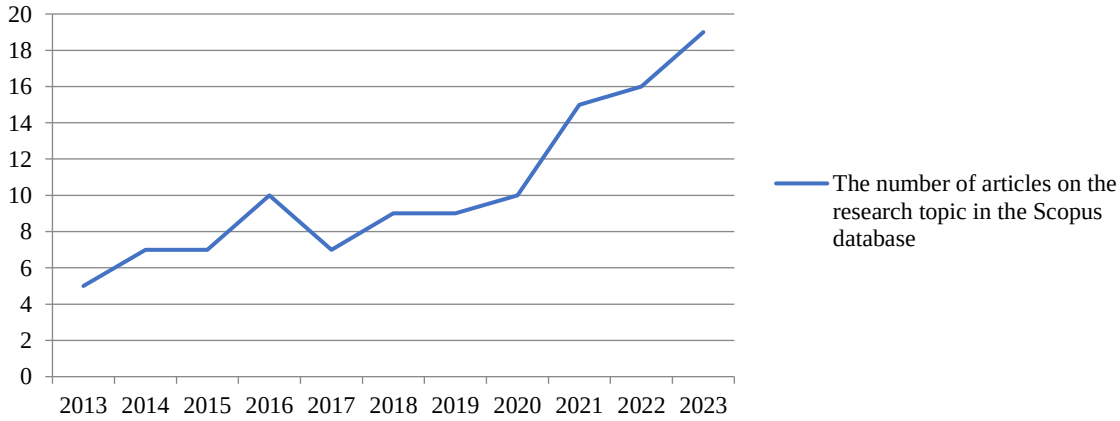
Research methods and organization

Research methods: theoretical methods - analysis, comparison, citation, generalization. We also conducted an incoming and final survey on the Google disk platform for 1st year students.

Research in the field of digital etiquette is constantly growing and may become a key area of research in the field of human-computer interaction. Despite the fact that the concept of digital etiquette includes laws, rules and technological aspects, we propose to conceptualize it as digital social norms that regulate interactions carried out using digital technologies. In Figure one, one can clearly see how the number of scientific articles published in the Scopus database has been increasing over the past 10 years.

Figure 1

Number of scientific articles on digital etiquette in the Scopus database (2013-2024)



It is impossible to exclude digital technologies from the lives of the younger generation in order to reduce risk. As research by Krutka & Carpenter (2017) indicates, people in this age group were born and raised in the era of information technology, which is the driving force of

our globalized society. A group of scientists led by Martin (2022) recommends teaching the younger generation to use the Internet wisely. The concept of digital citizenship reflects the norms of responsible use of digital technologies. Mangkhang & Kaewpanya (2021) agree with this statement, emphasizing that appropriate education is required so that students are aware of the opportunities and threats associated with the digital world and understand their rights and responsibilities on the Internet.

Etiquette is the application of appropriate norms of behavior in various situations as a manifestation of politeness. As noted by Kongjan and colleagues, this is a system of social practices and relationships between people, approved and passed on to the next generations in the form of accepted behaviors (Kongjan et al., 2021). Etiquette is part of a culture that can evolve over time, as well as adapt to changes in society, including the post-digital era. Heitmayer & Lahlou (2021) point out that in recent years, for most people, interaction using digital technologies has become more common than face-to-face communication.

According to Mangkhang &Kaewpanya (2021) digital etiquette is an important social norm that needs to be introduced into the consciousness of citizens of the new social reality. They emphasize that living in a hybrid world of digital citizens can lead to confusion in the application of digital etiquette and skills between offline and online spheres, so it is important that educators help citizens develop as high-quality digital personalities and contribute to the creation of a safe and constructive society in the future. It is also important to conform to the social norm of interaction, which includes respect for the privacy of others and the ability to choose the right time for communication. For example, in the modern world, communication has become extremely convenient, but despite this, it is important to be able to choose the right time for contacts, which contributes to a more effective use of communication technologies.

According to Ribble (2021), digital etiquette is the foundation of digital citizenship, describing «an electronic standard of behavior or procedures related to the process of thinking about others when using digital devices». This type of etiquette defines the use of technology and includes positive attitudes and actions aimed at reducing the number of offenses in cyberspace. People with digital literacy are ready to address issues such as cyberbullying, cybersecurity, and digital footprints. Therefore, literacy in the field of digital etiquette should become a priority in the education of young people, including students of higher educational institutions.

According to researchers Heitmayer & Lahlou (2021) and their colleagues, digital etiquette is not just a derivative of traditional rules of behavior. It develops independently, forming new norms of interpersonal communication specific to the digital environment. These norms are also beginning to have an impact on communication outside the digital space, given the increasing intensity and directness of our online interactions. In fact, in recent years, online communication has become more common for many people than face-to-face meetings.

As researches by Ponce et al. (2022), Soler-Costa et al. (2021) indicate, digital etiquette is often associated with the development of specific rules, such as determining the time interval for responding to an email, the possibility of adding an organization's head to friends on Instagram, or expectations regarding clothing or the background of a video call when working remotely.

In a study conducted by Zheng (2024) and co-authors, an analysis of the current state of digital literacy education in China is presented, which notes its lagging behind developed countries. The practice of teaching digital literacy has not yet become widespread in primary schools, and research in the field of digital etiquette is not conducted thoroughly enough. Existing content is usually presented in the form of academic lectures, thematic classes, or educational materials focused on safety aspects, which limits learning and causes low motivation and interest on the part of students. Therefore, offering Chinese students in the field of digital literacy, especially with a focus on digital ethics, seems to be a difficult task. As one

of the solutions, they developed and implemented a course in one of the schools in China based on digital games, which aims to develop students' skills in the field of digital etiquette in order to improve their understanding and behavior on the Internet. It is believed that when students show politeness in their speech on social networks and learn to respond effectively to verbal violence in online games through the use of suggested games, they not only improve their awareness of digital etiquette, but also form positive behavior in an online environment. However, such a study requires more detailed study in the future.

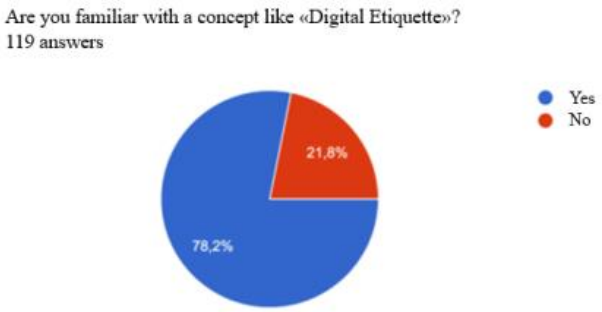
Digital etiquette, reflecting the specifics of Web 3.0, covers the following areas: communication on the web (social networks, messengers, e-mail); user interaction with modern gadgets (smartphones, tablets, etc.); self-presentation in the virtual space of digital reality.

Students in higher education institutions at the bachelor's level are people aged about 17 to 25 years old, who make up the first generation, who have been actively using the Internet and digital technologies since childhood. Data collection took place between January and February 2024 using the Google disk platform. With the help of this platform, 119 students of pedagogical and creative specialties of the 1st year of the Abai Kazakh National Pedagogical University and the Kazakh National University of Arts took part in the survey «How well do you know digital etiquette?». The survey consisted of 13 questions, where the main goal was to determine the level of knowledge of the theoretical foundations of digital etiquette.

To the question «Are you familiar with the concept like «Digital etiquette?» 93 (78.2%) of respondents replied that they are familiar, but 26 (21.8%) replied that they do not know what digital etiquette is and may be hearing it for the first time. That is, there is a need to familiarize students of the 1st year with this concept (Figure 2).

Figure 2

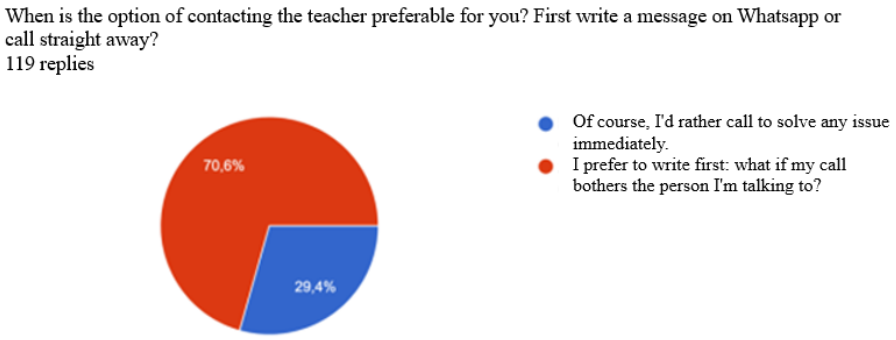
Results of the question about knowledge of the concept of «Digital Etiquette»



84 respondents (70.6%) prefer to write on Whatsapp before calling a teacher, so as not to bother them once again. However, 35 students (29.4%) prefer to call in order to immediately get an answer to their question (Figure 3).

Figure 3

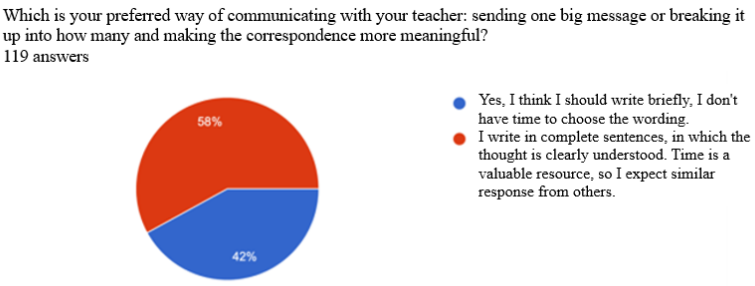
Results of the question about students' preferences when contacting a teacher in an online environment



69 respondents (58%) prefer to write to the teacher in complete sentences in which the purpose of the appeal is clearly understood, in addition they expect the same answer. On the contrary, 50 first-year students (42%) want to write briefly and divide the message into several small ones (three to five short ones), which does not correspond to etiquette (Figure 4).

Figure 4

Results of the question about the volume of messages when a student contacts a teacher via messenger



The answers to the question show almost the same result. «What is your opinion about the number of emojis and stickers in messages to the teacher: do you prefer to use them less or do you think that more is better?». 59 respondents (49.6%) replied that emojis and pictures, on the contrary, enrich and make the message interesting. This is the very essence of virtual communication. 60 students (50.4%) agree with the opinion that it is better not to overload the message and observe business ethics in communicating with the teacher.

When asked about sending screenshots, links and videos to the teacher, 82 students (68.9%) replied that they send the information that is relevant to the conversation, as well as explain the nature of this information. 37 respondents (31.1%) replied that they send links with information related to the conversation. And they try to immediately explain what is on this link. The numerous notifications in the messenger are extremely frustrating.

86 students (72.3%) believe that it is advisable to avoid sending screenshots of information that the teacher will have to retype manually. In their opinion, it is necessary to respect and appreciate the time of the interlocutor, that communication should be based on the principles of respect for each other. However, 33 students (27.7%) do not share this opinion, they believe that this is not their problem, since in the digital age, the most important thing is the speed of sending information.

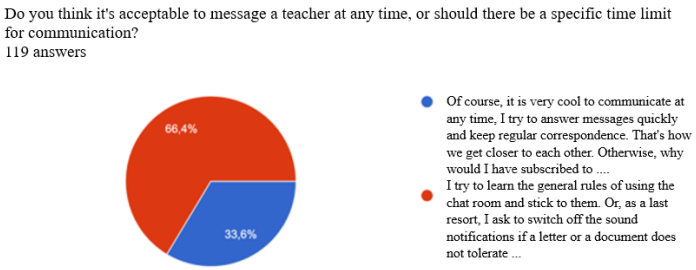
66 students (44.5%) believe that it is very important not to pile up meaningless streams of information when sending a message to a teacher, as this is one of their important rules for environmentally friendly and high-quality communication. If you use this rule, it will become easier and more efficient to work and communicate in a network environment. 53 students (44.5%) have a completely opposite opinion. According to them, during correspondence with the teacher, you can freely move from one topic to another, since this action enriches the conversation, makes it more lively and interesting.

8th question is related to voice messages sent by students to the teacher. 89 students (74.8%) believe that it is better to clarify beforehand whether it will be convenient for the teacher to receive such messages. The main rule of etiquette, including electronic etiquette, is respect and politeness in communication. But we cannot exclude that 30 first-year students (25.2%) believe that it is very convenient to send voice messages to a teacher, since there is no need to spend time composing the text of the message and there is an opportunity to speak quickly.

To question 9, 79 students (66.4%) replied that they try to learn the general rules of use at the very beginning and adhere to them throughout the existence of the chat. However, 40 respondents (33.6%) replied that it is normal for them to write to a teacher at any time to conduct regular correspondence. Thus, in their opinion, this is how the teacher and the student become closer to each other (Figure 5).

Figure 5

Results of the question about the acceptable time to send a message when a student contacts a teacher via messenger



More than half, namely 87 students (73.1%) answered 10 questions as follows: they try to adhere to a friendly or more businesslike style in conversation, and that it is very important not to get personal, observing proper boundaries. They consider it appropriate to use phrases like: «Good afternoon!», «Hello», but 32 students (26.9%) have the opposite opinion.

66 respondents (55.5%) believe that a huge number of punctuation marks are perceived as raising the tone and shouting. They try to use the text in all capital letters only in abbreviations. However, with a small difference, 53 of the students (44.5%) believe that they

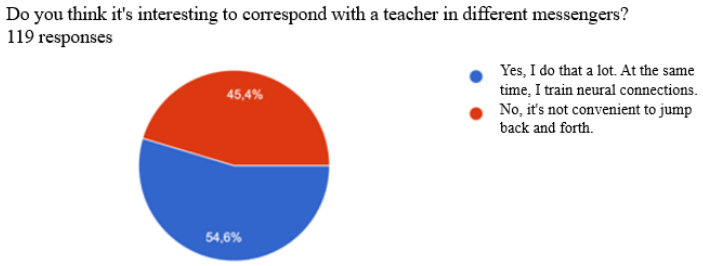
are emotional people, the use of punctuation marks helps them to attract the attention of the interlocutor.

88 respondents (73.9%) try to switch their phone to silent mode in the classroom, they consider this a rule of good manners, as in the theater. In their opinion, this shows respect for the interlocutor. During the lesson, extraneous sounds are very distracting and cause collective negativity of all those present. 31 respondents (26.1%) have a different opinion, they believe that a girlfriend or a friend can call him, and there is a chance that they will not hear the call, and therefore the phone is not put on silent mode.

65 first-year students (54.6%) find it interesting to enter correspondence with a teacher in various messengers, such as Whatsapp and Telegram. 54 out of 119 respondents (45.4%) consider it not convenient to jump from one messenger to another (Figure 6).

Figure 6

Results of the question about communication between a student and a teacher through various messengers



Research results and discussion

Based on the results of the survey, we came to the conclusion that 70% of students are familiar with the concept of digital etiquette, but 30% have gaps in some issues. In this regard, for the further development of digital etiquette, we held a coaching session, where we identified the expectations of students, what kind of help they want to receive from a teacher and an adviser.

According to the results of the coaching session, it was revealed that the majority of students believe that the teacher is an employee who can answer any questions about the university 24/7.

Next, using the Grow model, to identify a clear goal for students, where thoughts flow from setting goals to understanding reality. In this model, students consider options for actions that will help them achieve their goals. Ultimately, it is a choice of actions that will be implemented in the near future.

Having heard the expectations of students from the work of a teacher, we jointly developed common standards, which prescribed the norms and rules of digital communication between students and teachers, that is, working hours, information exchange format, etc.

Thirdly, we jointly discussed the use of corporate mail and WhatsApp messenger for effective communication and information exchange between students and the teacher. To achieve this goal, we conducted a training seminar on the topic «Electronic business letter. Rules of writing», and also talked with students using the «open microphone» method about etiquette in WhatsApp. It is very important to learn how to conduct a conversation online correctly, since the tactless behavior of one person can cause a lot of inconvenience to another.

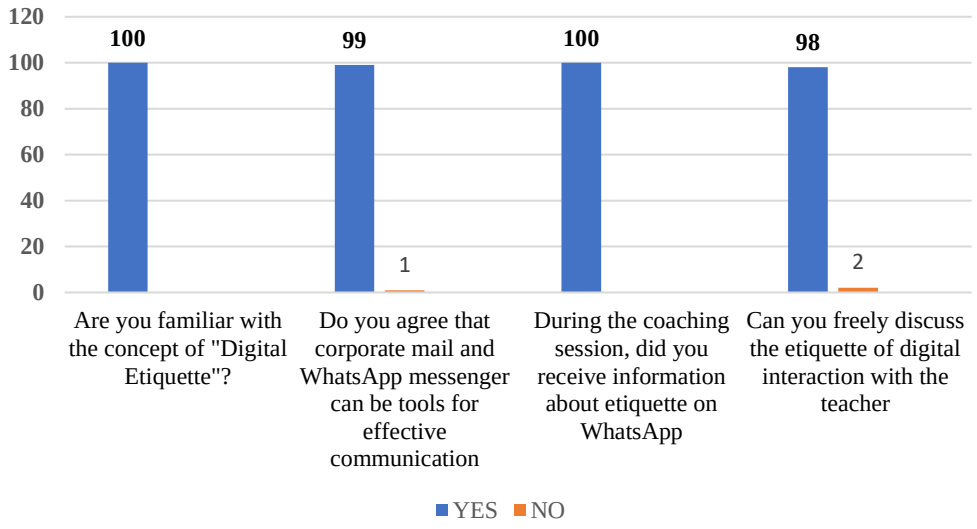
Fourth, to hold regular meetings to assess the level of satisfaction and effectiveness of digital interaction between students and teachers, as well as to identify possible problems and suggestions for their solution. For example, Pizza time is often held in foreign universities, where you can talk more informally, discuss students' concerns with their teachers.

Fifth, to improve work with first-year students during the career guidance week at the very beginning of the academic year, where it is clearly possible to explain and teach ways to effectively cooperate with a teacher.

At the end of the coaching session, a survey control method was conducted with applicants using the Google disk platform to identify the level of mastering of the material provided in the coaching session (Figure 7).

Figure 7

The results of applicants at the end of the coaching session



Conclusion

Having analyzed the research method of this article, the authors emphasize the importance of conscious use of digital technologies in modern education. Effective interaction between students and their advisors requires not only technical literacy, but also the development of digital etiquette.

Based on practical research, it can be concluded that successful cooperation in the era of digitalization requires respect, clarity of communication, trust and the ability to effectively manage information in an online environment. The development of digital etiquette is necessary for both students and teachers to ensure high-quality interaction and the achievement of common goals.

Emphasizing the importance of digital etiquette in the educational process, attention should also be paid to the constant updating of knowledge and skills in the field of digital technologies in order to effectively adapt to a changing environment. Only ethical and conscious behavior in the digital space will create favorable conditions for successful learning and development.

Thus, the development of digital etiquette is a key element of modern education, contributing to improving the quality of interaction between students and teachers. Understanding and practicing digital etiquette opens up new opportunities for collaboration and the successful realization of educational goals in the digital age.

Conflict of Interest Statement

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

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INNOVATIONS FOR INNOVATIONS: WHAT EDUCATIONAL PROGRAMS SHOULD BE LIKE

Abstract: The changing economic structure, the emergence of innovative technologies, the growing importance of sustainable development, social challenges, and the need to find new non-standard solutions have predetermined the need for a new type of professionals in the labor market. Consequently, new requirements are imposed on universities to prepare graduates capable of solving the problems of the innovative economy. The approach to developing academic excellence through the development and implementation of innovations is becoming a marker of the quality of education. Universities can ensure that graduates achieve learning outcomes only through innovative educational programs.

The article analyzes the understanding of the concept of "innovative educational programs". The authors studied the interpretation used in regulatory acts, scientific publications. Based on the analysis of publications, they developed a classification of innovations in education. To clarify the understanding, a survey of educational program developers and top management was conducted, based on which the perception of the academic community was identified, and distinctive characteristics were formulated.

Keywords: higher education, innovation, innovation in education, classification of innovations, educational programs, innovative educational program, academic excellence.

Introduction

Innovations are inextricably linked with changes, their emergence occurs with the aim of resolving contradictions and eliminating shortcomings, to improve the current state with minimal costs. Innovations in education occupy a special place in the development of the economy. Education, unlike other sectors of the economy, has a dual nature - in addition to the fact that it itself can be an area that attracts finances and creates profits, it also helps to improve human potential for other sectors of the economy.

The competitiveness of states is achieved through the academic excellence of universities. Since 2023, the Ministry of Science and Higher Education of the Republic of Kazakhstan has been implementing an academic excellence program in higher education. The academic excellence program is aimed at achieving three strategic goals: (1) improving the quality of higher and postgraduate education and the competitiveness of universities; (2) strengthening the educational and scientific potential of universities; (3) building up the institutional potential of universities and developing an institutional culture. Considering the implementation of a large-scale initiative of the Ministry, the implementation of innovative educational programs by universities is becoming particularly relevant in light of achieving academic excellence in educational activities.

The change in the technological structure, digitalization and increase in the information flow, expansion of the world from local to global, cross-cultural intersections and changes in meanings, the desire to accelerate the transition of Kazakhstan to the post-industrial have led

to the emergence of a need in society and the labor market for a professional with universal competencies at the junction of areas, with responsibility and the ability to make decisions, as well as high social responsibility. Digitalization, sustainable development, globalization, changes in the economic structure, exacerbation of social conflicts and stratification of society, the transition from consumption to responsible consumption - all these trends are reflected in the social demand of society for universal professionals - university graduates. Generation Z is distinguished by a high level of ambition and self-sufficiency, inflated career expectations, the desire to immediately take a decent position. However, employers' express dissatisfaction with graduates of traditional universities since the demands of the labor market are now at the junction of various areas of human activity and scientific research.

To ensure the quality of education in Kazakhstan, a transition was made from quality control to quality assurance, from certification to accreditation. Since 2019, the registration of all educational programs in the national Registry has begun. This Registry is moderated by the National Center for Higher Education Development. The Registry defines three types of educational programs: current, new and innovative. As part of the creation of Academic Excellence Centers based on regional universities, it is expected to develop innovative educational programs. At the same time, the concept of "innovative educational programs" is not enshrined in the Law on Education of the Republic of Kazakhstan, which is one of the types of uncertainty since it is used intuitively. The lack of clear criteria for determining the type of educational program creates difficulties in determining its type when including in the registry, as well as when excluding from it. The purpose of this article is to project the understanding of innovations onto the educational sphere, develop a classification of innovations in education, clarify the understanding of "innovative educational programs" in the context of the strategy for changing the educational system. The article attempts to systematically present the current state of the spectrum of innovative educational programs of Kazakhstani universities.

Methods and organization of the study

In accordance with the goals and objectives of the study, at the first stage a review of the literature devoted to the issues of innovation in general and innovation in education in particular was conducted. The study was conducted based on studying publications that consider issues and approaches to the implementation of innovations in education and the development of educational programs in the modern conditions of technological change. The article proposes a classification of types of innovations in education based on the object of the emergence of innovations. Consistently revealing the logic of the emergence of the concept from innovations through innovations in education to an innovative educational program, the authors clarified the understanding of the concept. After studying the publications, the authors conducted a questionnaire survey aimed at identifying the understanding of the concept of "innovative educational programs" by developers. The survey involved 873 respondents - developers of educational programs and top management of universities.

All participants in the survey and in-depth interview gave their informed consent to voluntarily participate in the study before taking part in it. Interviews and discussions were recorded and processed. Survey responses were automatically stored, summarized, and processed using statistical and qualitative methods. Only study organizers had access to data.

The authors clarified the content of the concept of "innovative educational program" (hereinafter IEP) based on an analysis of publications and the results of an analysis of the results of a survey of educational program developers. The authors analyzed the developers' perception of the term "innovative educational program". Monitoring innovative educational programs included in the Register allowed them to assess their connection with the industry Atlases of new professions and competencies. After that, a broad discussion was held during the Republican seminar for developers of educational programs. During the discussion, special

attention was paid to the specifics of developing the IEP, interaction with the region, the use of innovative teaching, learning and assessment methods. The results of the discussion served as the basis for the discussion and reflection of the authors of the publication, based on which recommendations were developed.

The results of the study and discussions

Innovations in Education

The development of society and the economy occurs through the emergence and spread of innovations. At one time, such breakthrough innovations as the invention of writing, printing, the advent of electricity, computerization and digitalization became bifurcation points for information revolutions. Innovations by their nature become drivers of economic development, ensuring the emergence of new products, goods, services, and processes. Post-industrial society has shifted the emphasis from corporations to universities as a place where new knowledge and new human resources appear, ensuring the competitiveness of states in new activities (Bell, 2020).

The concept of "innovation" in a positive connotation became a necessary criterion for the success of entrepreneurial activity and economic growth in the early 20th century in the works of Joseph Schumpeter (Schumpeter & Swedberg, 2021). He identified five types of innovations associated with the emergence of a new product or service, changes in production technology, the opening of new market niches, a new source of raw materials or materials, and improvement of the organization of production.

The reasons for the emergence of innovations may be external circumstances that force us to find and implement a new solution. In this case, innovations are reactive. And in contrast to them, there are (Lucia et al, 2022; Goldyakova, 2006, etc.) proactive or strategic innovations, reflecting a free creative meaningful desire to create something new to achieve the intended goals. According to the functional feature and area of application, the following types of innovations are distinguished: technical, technological, organizational, and managerial, informational, social. The scale and duration of the changes caused by the innovation determine whether the innovation will be:

- strategic, tactical, operational, or situational,
- revolutionary/radical, improving, modifying,
- systemic or fragmentary/partial,
- long-term, medium-term, and fast/short-term.

The innovation life cycle (Husig et al, 2021) consists of the following stages: development, industrial production, marketing, logistics, diffusion, routinization, service. Evans & Berman (2002) identify seven stages of innovation promotion, including: innovation generation, product evaluation, concept testing, economic analysis, product development, test marketing, commercial implementation.

Researchers - economists (Urban et al, 1993), relying on the specifics of marketing activities, identify the following stages of innovation implementation: identification of market opportunities, design of a new product, its testing, implementation, and management. The main emphasis is on the dissemination of innovation to make a profit or achieve a socially significant goal.

Modern recommendations for collecting and analyzing data on innovation are reflected in the 4th edition of the Oslo Manual, which is a joint publication of the OECD and Eurostat (OECD / Eurostat, 2018). The Guide emphasizes that innovation can be both the result of a project and an activity / process and provides the following understanding. "An innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)". This publication provides a classification

of innovations by areas of innovation implementation: product and service development, production of goods, provision of services, marketing and sales, digital technologies, administration and management, business process engineering. Projecting this understanding of innovations onto the education sphere, considering its specifics, the following conclusion can be made. Thus, an innovative educational program can be understood as a new product or service that differs significantly from educational programs offered on the market. Since education (Lovelock, 2005) refers to the type of services that are carried out within the framework of the learning process with the active participation of the consumer, innovative educational programs represent a symbiosis of product and process innovation.

Understanding innovation applies to all areas of human activity, including education. At the same time, education is one of the conservative areas of the economy since the classroom-lesson method has remained unchanged since the time of Jan Amos Kamensky. At the same time, according to Westera (2004), technological innovations and high competition stimulate strategic changes in education and the accompanying innovations in education. At the same time, education is the foundation of a country's competitiveness and a precursor to the emergence of innovations (Barrichello, 2020; Looney, 2009; Zagvyazinsky, 2007). Education responds to the uncertainty of economic development, social challenges and complex changes in society, the economy, and the technological order through the emergence of novel approaches in education, creating new systems of learning and teaching based on technology. Thus, education changes through innovation, creating a phenomenon called Education 4.0 (Ramirez-Montoya et al, 2022). The number of publications in the RSCI (as of July 25, 2024) with the keyword "innovations in education" is 1734, considering the translation 2241, "innovative educational program" is only ninety-one titles. A search for publications in Google Scholar with the keyword "innovation in education" offers more than 32.7 thousand results. And with the keyword "innovative educational programme" - more than 17.1 thousand. Therefore, we can conclude that this area of research is insufficiently developed in the Russian-language research segment, including in the countries of Central Asia.

Stepanenko (2012) emphasizes that "any activity in any field can be innovative if something new is added to it, including knowledge, technologies, techniques, approaches, in order to obtain a result in demand by society" - a service or product. The innovation process has the following characteristics (Makarova, 2015). It is inherent in:

- objective nature, as it arises as a result of the influence of the historical context and objective laws of development of society,
- probabilistic nature,
- risky nature,
- systemic nature,
- communicative nature,
- interdisciplinary nature.

The innovation process and the innovation implementation process are often used as synonyms in research publications (Stepanenko, 2012). Although in essence these are two different concepts. The innovation process is a process of an enterprise or organization during which an innovative product or service is created, or an activity (including marketing, management, organizational processes, etc.) is implemented in an innovative, non-classical way. The innovation implementation process refers to the reengineering of enterprise and organization processes, which involves the incorporation of innovation into an activity or a product basket, assuming the transfer of innovation from a unique (Biloshchytskyi et al, 2021) project to an everyday routine process. The innovation implementation process, according to several scientists, is a component of the innovation process.

Analysis of innovation implementation processes (Stepanenko, 2012) made it possible to compare the linear and interactive/chain models, revealing the advantages of the latter. The

chain model provides for the presence of feedback between the related stages of implementation and dissemination of innovations. The scope of the linear model is innovation with precisely defined development programs that do not contain ambiguity and uncertainty.

The main way to implement innovation (Mandic et al, 2010) is technological innovation related to digitalization, the introduction of multimedia, distance, and asynchronous learning. Westera (2004) formulated four principles of innovation in education: transparency and interactivity of educational technologies, the socio-cultural significance of products, the importance of values that go beyond efficiency and political bias associated with technology.

It should be noted that as the economic development of society decreases, the time of both the emergence and dissemination of innovations is reduced, which is a period in the first case between the emergence of an idea and an innovative product, in the second case between the emergence of an innovative product and its mass distribution. Namely, mass distribution is the criterion for transferring an innovation to the status of everyday life/routine. Consequently, universities must promptly respond to breakthrough innovations through their educational programs and processes. In addition, it is important to determine the criteria for the transition of educational innovations to routine, everyday processes. As well as the very order of transition of innovations in education into everyday practice.

Educational innovation (Jacobs, 2000) is understood as a new practice or activity that has not yet been implemented in a specific academic context or has been implemented to a limited extent, but is aimed at developing, improving, increasing the relevance, or responding more quickly to the needs of the educational program, learning and teaching processes. At the same time, over the past two decades, the issues of defining, measuring, and evaluating innovations in education have been the focus of both individual studies and international and national agents (Halacz, 2018; Jacobs 2000; Foray & Raffo, 2014; Roberts & Owens, 2012). Summarizing these studies and turning to the theory of innovation, it can be noted that innovations in education are characteristic of all stages of the life cycle of educational products and services. Innovations in universities play a key role in the adaptation of educational organizations to a rapidly changing world (Gutierrez & Baquero, 2017). They help improve the quality of education, increase the effectiveness of research, and ensure more active interaction with society and the labor market. Most studies of innovation in education focus on the processes initiated by innovation agents (accreditation agencies, national agencies, curriculum developers, research groups, etc.). These innovation agents (Halasz, 2018) interact in various spaces and contexts, solving problems, creating innovative solutions, or adapting existing solutions. A significant part of the solutions concerns process innovation and involves the implementation of technological solutions based on digitalization. Innovations related to the emergence of a new educational product and, as a result, innovations in the field of new content of educational programs occur less frequently.

Although each innovation is an idea that differs from existing practice, innovations differ in their scale, involvement of resources and processes, adaptation, or revolutionary changes (Earl & Timperlry, 2015). Innovations are often unpredictable, which is why the project approach is one of the ways to implement innovations. Verification and validation help reduce the risks of implementing innovations. Innovations in universities can be classified according to various criteria, including their nature, scale, scope, and goals. At the same time, the development of digital technologies has naturally reflected in the introduction of innovations into the learning process itself, changing the methods of teaching and learning. Summarizing several of the above publications, the following classification of innovations in education can be proposed:

1. Innovations in the design of educational products

– Design of educational content, using foresight of learning outcomes that will be in demand in the future.

- Development of flexible curricula that can be adapted to the needs of students and the labor market, including the creation of interdisciplinary courses and programs.
- Design of educational programs based on an atlas of new professions and competencies.
- Design of individual educational trajectories for students, considering both the needs of society and the labor market, as well as their desires and capabilities.

2. Innovations in the implementation of educational products/services:

–digitalization of the educational process has led to the creation of new educational technologies: online learning, blended learning, interactive platforms, and mobile applications for learning. This also includes the use of virtual and augmented reality to create an immersive learning experience.

–Use of active, heuristic teaching methods that involve learning through projects, learning through research, dual learning.

–Reorientation of assessment methods from knowledge assessment to assessment of learning outcomes: essays, project work, portfolio and self-assessment, demonstration exams.

3. Innovations in opening new niches in the educational services market.

- The emergence of educational marketplaces
- Massive online open courses – Coursera, etc.
- Creation of online universities by international corporations – Microsoft, Google, Yandex.
- Involvement of banks in the educational process.

4. Innovations in enhancing the human potential of teachers and their support:

- Creation of centers for consulting and supporting teachers.
- Cascading KPI for each teacher.
- Definition of individual plans for professional and personal development of the teacher based on diagnostics and attendance of classes.

5. Research innovations:

- Interdisciplinary research through the creation of research centers that bring together scientists from different fields to solve complex problems (e.g. sustainable development, health and technology).
- Application of open science principles, including access to data and publications and experimental data, which contributes to the wider dissemination of knowledge.
- Creation of laboratories and incubators for the development of modern technologies and products that can be commercialized.
- Artificial intelligence as a means of data analysis, source search and situation modeling.
- Conducting virtual experiments based on models of processes and phenomena.

6. Managerial innovations:

- Implementation of new corporate governance models that ensure transparency of decision-making, such as decentralization, student participation in management.
- Use of digital tools to understand the specifics of processes and decision-making, to improve the efficiency of administrative processes.
- Development of new funding models, such as crowdfunding for scientific projects or partnerships with the private sector.

7. Social innovations:

–Activities and projects aimed at interacting with local communities, for example through volunteer projects or joint research, as well as the emergence of the university for the city model.

–Development of programs and initiatives aimed at supporting students from different social groups, including people with disabilities.

–Accessibility of education, ensuring the opportunity to receive an education for students from different social groups and with different income levels.

8. Technological innovations:

- Digitalization of processes through the implementation of a learning management system (LMS), automation of administrative processes, documentation systems.
- Use of big data and decision-making to improve the quality of education and educational results, predicting student success based on the results of using analytical tools.
- Use of artificial intelligence to create individual educational trajectories, support the learning process.

9. Innovations in creating an educational environment:

–Inclusive environment.

–Creation

–Virtual environment, mixed reality.

–Green technologies and resource saving.

–Availability of information and educational content 24/7.

–Psychological and social support.

10. Ecological innovations:

–Implementing sustainability practices on campus, such as renewable energy, recycling programs, and green spaces.

–Assessing the degree of environmental friendliness through the Greenmetrics ranking of "green universities."

–Incorporating sustainability topics into curricula and research projects.

The given classification of innovations in education allows us to determine the type of innovation and develop a system of measures and a roadmap for their implementation and implementation corresponding to the type of innovation. If we talk about the implementation of innovations in education, we are talking about projects that change the current situation and the projected future. The innovativeness of strategies for organizing education allows us to ensure their contrast and effectiveness.

In higher education, there are several target groups for whose needs innovations appear. Each of these groups has its own expectations and needs, which in turn determines the directions of innovative solutions. Thus, we can propose the following classification of innovations in education, depending on the stakeholders.

Table 1

Classification of innovations in education depending on stakeholders.

Stakeholders	Expectations	Innovative solutions
Students	Access to quality education and relevant knowledge. Flexibility in learning (online formats, blended learning, different learning paces, individual trajectory). Opportunities for practical application of knowledge (internships, projects). Support in career growth and employment.	Implementation of online courses and educational platforms. Development of interactive educational materials and applications. Creation of internship programs and partnerships with companies. Micro-qualifications. Minors. Credit transfer and recognition of acquired competencies. Professional certifications. Use of virtual and augmented reality technologies for practical classes. Access to educational content and information resources 24/7 from anywhere. Artificial intelligence as a tool to support the learning process. Career counseling and support after graduation. Upgrade of diploma and

		competencies. Educational podcasts. Dual education.
Faculty members	Support in developing professional skills. Access to modern teaching methods and technologies. Opportunities for scientific research and publications. Academic freedom and freedom of creativity and research.	Conducting trainings and seminars on new teaching methods. Creating centers for developing competencies and support. Implementing platforms for exchanging experience and resources between teachers. Encounter groups. Creating open research centers and laboratories based on universities and enterprises. Financing the participation of teachers in professional and research dialogue platforms. Mentoring. Coaching. Individual programs for personal and personal development. Win-win tactics in cascading the university development strategy. Motivation and incentive programs.
Top management of universities	Effective management of resources and processes. Increasing the competitiveness of the university. Improving the quality of education and student satisfaction. Favorable image of the university. Productive relations with the Ministry of Science and Higher Education and local executive bodies.	Implementation of learning management systems (LMS) to automate processes. Decision-making based on big data. Continuous monitoring of processes. Using analytical tools to evaluate the effectiveness of programs. Development of strategies to attract students and improve the image, PR & GR strategies.
Employers	Training of universal specialists who meet the requirements of the labor market in terms of regional needs. Training of a socially responsible professional who is able to work in a team and make decisions. Readiness of universities to cooperate in the field of internships, practices and involvement of practitioners in the educational process. Readiness of universities to conduct research on solving the problems of enterprises.	Creation of joint educational programs with employers. Development of practice-oriented training courses. Integration of professional advanced training courses and professional certification into the educational programs of universities. Organization of job fairs and employment events at universities. Introduction of modular training, allowing students to choose courses that meet the requirements of employers. Development of educational programs based on professional standards and Atlases of new professions and competencies.
Government bodies	Ensuring quality education and compliance with standards. Increasing the country's competitiveness. Solving the problems of personnel shortages for the needs of the regions and unemployment. Smoothing out the asymmetry between the needs of the region and, on the other hand, the expectations, desires and capabilities of graduates. Supporting regional initiatives in the academic environment and involving them in their solution. Loyalty to the leadership of the region, industry and country.	Development of national programs for digitalization of education. Implementation of quality and accreditation standards. Support of grant programs for research in the field of education.

Each target group in higher education has its own unique expectations that require appropriate innovative solutions. The success of innovation depends on the ability of universities to adapt to the needs of these groups and actively involve them in the change process.

However, all innovations are ideally aimed at one common goal - meeting the market demand for in-demand personnel, which is achieved through the quality of education. And, therefore, at implementing an approach to achieving academic excellence by Kazakhstani universities through the development and implementation of innovations.

Innovations in education do not exist separately, they are interconnected and united by educational goals, content and process.

An innovative educational program can be considered as a product and process innovation at the same time. Product innovation in the context of an educational program includes the creation of new courses, teaching materials, teaching technologies or assessment methods. Process innovation concerns changes in the methods and processes by which training and management of the educational process are carried out. It may include management of the educational process, information, including feedback, reflection and external assessment.

Product and process innovations in education are closely related. A new educational program (product) requires changes in the processes of its implementation. For example, the introduction of an online course requires new approaches to interaction with students and to the organization of teaching and learning processes. Focusing on one of the sides can lead to risks. For example, if the emphasis is only on the creation of new educational programs without changing the processes of their implementation and assessment, this can lead to low efficiency of training.

In a rapidly changing uncertain world, it is important not only to develop new educational programs, but also to be ready for their rapid adaptation. This requires flexibility in processes and flexibility in the use of resources. It is necessary to take into account that innovations may not always lead to an improvement in the quality of education. It is important to analyze the need and effectiveness of the changes being introduced. The introduction of innovations may encounter resistance from teachers and students, which emphasizes the need for cultural transformation in the educational environment.

Within the framework of academic activity, it is the educational program that is the place for the implementation of innovations. The very concept of an educational program is broader (Maritz, et al, 2014) than its content, with which it is often identified. The educational program itself is an innovation in education, so it should be considered as a symbiosis of the educational product/service and the process of its implementation - the educational process from the perspective of the cultural approach. An innovative educational program (Chandra et al, 2021, Kupriyanov, 2020) is presented as a combination of innovative educational content and innovative program implementation process.

One of the tools for creating innovative educational programs is foresight, which allows you to design the future based on expert opinions. The involvement of a wide range of Kazakhstani experts and representatives of the labor market made it possible to create 9 industry Atlases of new professions and competencies in the Republic of Kazakhstan in 2020 and move on to the development of Regional Maps. The creation of the Atlas of New Professions stimulated the development of innovative educational programs (IEP). The Atlas made it possible to combine the real needs of the labor market and new industry challenges. Considering the development priorities of the regions, OHPEs carry out development, providing for new learning outcomes. Since 2019, 262 innovative educational programs have been developed in 49 Kazakhstani universities (data as of March 1, 2024). In May 2022, the NCRE based on Toraigyrov University held a Republican seminar, after which the number of IEPs in the country increased more than seven times. At the same time, the growth of IEPs occurred due to regional universities, regional universities (199 IEPs) are significantly ahead of national universities (63 IEPs).

The Register of Educational Programs was created in 2019 to ensure the quality of education through verification of the content of education. The Register is posted on the

Unified Platform of Higher Education of the Ministry of Science and Education of the Republic of Kazakhstan. The total number of educational programs in the Register as of June 30, 2024, was 8212 programs, of which 534 were innovative (6.5% of the total number of EPs). The 103% increase in the number of educational programs over 3 months reflects the systemic policy of the Ministry of Education and Science and regions to develop Atlases and Regional Maps of New Professions, as well as the participation of pedagogical universities in the "Finnish project" aimed at developing IEPs in the field of education. As of August 9, 2024, 648 IEPs (out of 8422) have already been included in the Register. Over the past 2 years, until March 2024, 161 innovative programs were included in the Register, and 86 innovative programs were excluded, 85% of which were due to the lack of a contingent of students.

These facts indicate that the procedure for developing innovative programs has not been sufficiently developed, which has led to their lack of demand and irrelevance. The presence of an IEP is becoming a key factor in shaping the University brand, an integral part of the strategy and is becoming the KPI of rectors and vice-rectors for academic work.

Currently, the understanding of the IEP as a term and criteria for including an educational program in the Register as innovative does not contain clear criteria but is carried out on the basis of an assessment of the program by three experts of the National Center for Education Development. The rules for maintaining the register of educational programs (order of the Ministry of Education and Science of the Russian Federation dated October 12, 2022, No. 106) propose to include a program in the Register as innovative if it has no analogue in the Republic of Kazakhstan, is being implemented by the applicant for the first time and has successfully passed the examination of three experts. The examination of the educational program provides for an assessment of the focus on new types of activities, the priority of economic sectors and the region, a high level of demand for the profession, and a focus on economic development. The expert community periodically undergoes training, participates in the development of the IEP and discussion of the content of the programs at meetings of the Academic Council of the University and the Educational and Methodological Associations of the Republican Educational and Methodological Council of the Ministry of Science and Higher Education.

To study the opinion of the Kazakh educational community, a survey of universities was conducted, based on which innovative educational programs are implemented. 873 representatives of the OHPE took part in the survey concerning the qualitative characteristics of the IEP, of which 67.2% participated in the development of the IEP, 72.5% in the implementation. The survey was conducted on a ten-point scale. The survey proposed to determine the influence of criteria on the innovativeness of the EP, to determine the significance of external and internal factors that ensure its innovativeness.

The respondents included the following criteria characterizing the process of developing innovative educational programs:

- Developing an educational program based on the needs of a region/country - 10 points 50.6%, 9 points - 14.9%.
- Involving partner enterprises and representatives of the labor market in developing the innovative educational program - 46.6% and 16.2%.
- Involving partner enterprises and representatives of the labor market in developing the innovative educational program - 46.2% and 14.8%.
- Developing an educational program based on the Atlas of New Professions and Occupations or the Regional Map - 10 points 36.9%, 9 points - 12.9%.
- Developing an educational program based on the trends of the Atlas of New Professions and Occupations - 36.1% and 14.9%, respectively.
- Uniqueness of the educational program, absence of similar ones in the Register of educational programs - 39.1% and 12%.

According to the respondents, the process of implementing the IEP is also characterized by a number of factors, including:

- Use of innovative teaching methods - 52.1% and 15.3%.
- Completion of an industrial internship based on the EP - 49% and 14.9%.
- Involvement of practitioners with more than 10 years of experience in the implementation of the EP - 10 points 42.8%, 9 points - 15.3%.
- Study and solution of real cases - 41.4% and 17.6%.
- Application of the "learning through research" method - 40.4% and 17.3%.
- Organization of dual training based on partner enterprises - 37.8% and 15.6%, respectively.
- Involvement of researchers with experience in participating in scientific projects in teaching - 37.5% and 12.9%.
- The possibility of obtaining professional certification within the framework of mastering the educational program – 37.9% and 14.9%.
- Assessment through the protection of projects, portfolios – 36.5% and 16.4%.
- Inclusion of minors in the content of the educational program – 36.2% and 15%.
- Assessment through a demonstration exam with the involvement of practitioners – 33.8% and 16.7%.
- Integration of big data analysis and decision-making methods based on them – 33.7% and 16.4%.

The inclusion of micro-credentials qualifications in the individual educational program was supported in total at the maximum level by slightly more than a third of respondents – 25.5% and 12.8%. At the same time, the correlating parameter of the possibility of obtaining professional certification within the framework of mastering the educational program was supported in total by more than 50%.

Proposals to attract renowned foreign teachers and graduates of the Bolashak program, and to integrate MOOCs into the content of the EP did not receive widespread support - less than 25% of respondents supported them on a 10-point indicator. Trends in the integration of AI and the creation of virtual realities were supported by less than 45% of respondents.

At the stage of evaluating the IEP, after its completion, respondents noted the importance of the possibility of successful employment, its speed - 44.9% and 15.6%.

The need for training teachers was especially highly emphasized:

- innovative methods of learning, teaching, and assessment - 10 points 48.7% and 9 points - 15.1%.
- principles of selection and structuring of educational content - 42.4% and 16%, respectively.

Thus, it should be noted that it is necessary to hold national and regional seminars on the recognition and inclusion of micro-qualifications in educational programs, interactive offline seminars on the development of IEPs and the integration of innovative teaching, learning and assessment methods into them. It may be useful to hold competitions on the use of innovative teaching methods and create a database of video recordings of successful examples of the use of innovative methods in the study of specific topics.

A separate block of questions was devoted to methods of stimulating the development of IEP. More than 50% of respondents noted the importance of the following incentives at the maximum level:

- Professional development of teachers: Organization of seminars, trainings, and advanced training courses for teachers to familiarize them with innovative educational methods - 10 points 55.8% and 9 points 13.3%.
- Support programs: provision of special financial support to universities that develop and implement innovative educational programs - 10 points 46.6% and 9 points - 10.4%

- Grants: increase in quantity - 46.4% and 11% respectively.
- Subsidies for specific projects: purchase of equipment, creation of research centers, etc. - 45.1% and 14.1%.
- Introduction of a new position - professor/teacher of the IEP with a special bonus - 42.3% and 11.8%.
- Subsidies for the creation of Centers for the Support of Innovative Teaching and Professional Development of Teachers in OHPE - 41.4% and 12.6%.
- Grants: increase in cost - 37.3% and 12.7%, respectively.

Accreditation and ratings: consider the innovativeness of educational programs in the accreditation system of universities and rating lists, which can increase the prestige and attractiveness of educational institutions - 38% and 15.6%.

Proposals to change the qualification requirements for IEP teachers and introduce an alternative route to admission to the IEP master's program through Olympiads and competitions received support from less than 50% of respondents.

In general, it is possible to identify the survey participants' concerns about the level of competence of IEP teachers and the need for systemic support measures both at the national level and at the level of higher professional education institutions. The labor intensity of the IEP, the need to revise the infrastructure, software and laboratory equipment increase the cost of implementing the IEP, which leads to the need to increase the cost of grants. It is possible to stimulate universities to develop the IEP by increasing the number of grants allocated specifically for the IEP. It is also necessary to provide for the involvement of representatives of the labor market and potential employers at the regional level in the development and implementation of the IEP using administrative mechanisms and tax incentives.

Conclusions

Innovative educational programs are a complex object that systematically and consistently combines changes in the educational process to achieve academic excellence. Innovative educational programs, when developed and implemented at universities, lead to innovative changes in all processes and elements of the educational system. The development and implementation of an innovative educational program is a bifurcation point, as it gives rise to the emergence of something new and affects the entire educational system, stimulating strategic changes. Thus, only through an integrated approach to reforming education can we prepare specialists who can effectively cope with the challenges of the modern world and contribute to sustainable economic development.

At the same time, it should be noted that understanding the IEP is considered not only as a product characterized by new content, but also as a symbiosis of innovative results and processes that ensure advanced training of professionals who meet future needs. And, on the need to integrate artificial intelligence, critical and creative thinking, as well as lean manufacturing, kaizen, environmental friendliness, predictability and recycling approaches into all educational programs.

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DIAGNOSIS OF CAREER READINESS AMONG SENIOR UNDERGRADUATES AND GRADUATE STUDENTS: DIAGNOSTIC TOOLS, RESULTS OF CONFIRMATORY EXPERIMENT

Abstract: This study delves into the intricate landscape of career decision-making, transcending the conventional job selection paradigm to encompass a holistic understanding of oneself, an awareness of potential vocations, and insights into developmental trajectories. Conducted at Toraighyrov University in the Kazakhstan, the research engaged 310 participants, comprising 215 undergraduates and 95 graduate students. Spanning humanities and STEM fields. Key findings emphasize the critical need for tailored interventions, including a specialized career course targeting information utilization skills and self-awareness. The proposed enhancement of one-on-one career counseling sessions aims to empower students with lifelong skills for effective self-management. Employing the Career Decision-making Difficulties Questionnaire (and the Six Phases of Career Decision-making Questionnaire, the study delineates the six phases of career decision-making, shedding light on significant challenges that serve as prognostic indicators of career readiness motivation. A noteworthy finding reveals that 43% of fourth-year undergraduates and 47% of graduate students are positioned in the pivotal fourth phase, representing a fundamental competency for those embarking on their professional journeys. Furthermore, the study underscores the rarity of achieving the sixth phase, symbolizing a fully determined career choice, with only 15% of graduate-level respondents and 7% of undergraduates reaching this advanced level of decision-making prowess.

Key words: career choice, university students' career development, career decision-making, career readiness, higher education, psychological and educational support, undergraduate and graduate education.

Introduction

Rapid transformation has taken place in the Kazakhstan higher education system over the last ten years. The transition to a three-level education system (bachelor, masters, and doctoral degrees) has created a new educational context and motivation to research the psychological and educational readiness of students for independent planning of their future profession as they develop competencies necessary for making career decisions. Reforms in Kazakhstan's higher education system have affected almost all education levels and led to changes in the educational process requirements. Research indicates the integrated, interdisciplinary, and systemic nature of the learning process, as a result of improved education quality, personal orientation, continuity, and the multiple levels of study available. Current requirements set for bachelors and masters degrees reflect the importance of acquiring competencies which contribute to the growth of a person as a professional who knows how to set goals and make responsible decisions independently and in challenging circumstances. Thus, the current educational context and its requirements have established the need to describe effective ways of developing student competencies in career decision-making.

Contemporary circumstances establish fresh norms and frequently result in a reduced demand for graduates in the job market, a diminished enthusiasm to pursue careers in their field,

and the challenge of unemployment. There is a necessity to devise innovative approaches and strategies for engaging with students, as well as to offer guidance to career counselors in Kazakhstan universities. This is essential to proficiently align with the current demands imposed on graduates.

Young people are faced with making important decisions, including career-related ones, during the transition to adulthood. This is the phase when they must invest resources in a specific area of education or vocational training. However, the challenge is that this happens before they have accumulated sufficient life experience and understanding future work environment or actual work experience that will help them make conscious decisions and develop a sense of vocational identity. Currently, young people need support and advice from professionals, such as career/educational counselors and academic advisors.

Seeking employment, gaining suitable job opportunities, and strategizing future career trajectories are recurrent challenges confronting university graduates subsequent to the attainment of their qualifications. Impediments to the effective employment of university graduates encompass:

- The absence of mechanisms to establish a correlation between the labor market and educational programs.
- The human resource policies of numerous organizations, primarily concentrating on immediate achievements rather than future development.
- A prevalent deficiency in the essential skills among graduates for self-determination in the labor market, career advancement, and effective negotiation with employers during interviews.
- A notable lack of self-esteem among university graduates concerning their vocational qualification level.

Within our specific context, university graduates grapple with additional factors beyond their control. For instance, certain educational programs in Kazakhstan universities, although aligning students with the National Classifier of the Republic of Kazakhstan (NCP RK), National Qualification Frameworks (NQF), and Industry Qualification Frameworks (IQF), are inadequately represented in the country's labor market (MLSP, 2012). The professional and qualification requirements of most employers in Kazakhstan have surpassed the ambit of educational programs and standards. Despite the annual emergence of new integrated professions, educational programs directed at fulfilling these evolving requirements are conspicuously absent.

Moreover, beyond professional and qualification criteria, commonly referred to as 'hard skills,' employers are placing growing importance on the personal attributes or 'soft skills' of their employees. Universities, however, tend to accord less emphasis to the development of students' soft skills, predominantly concentrating on hard skill formation, which is regarded as the principal outcome of educational programs. Ideally, students should have the opportunity to cultivate a diverse range of qualities and skills during their university studies. Jones, Baldi, Phillips, and Waikar (2017) posit that, beyond grade point averages, recruiters are actively seeking employees with well-honed soft skills. These soft skills encompass self-awareness, respect for others, leadership acumen, a positive attitude, teamwork, self-confidence, critical thinking, and effective communication. Professionals are mandated not only to master the technical dimensions of their job but also to possess a repertoire of various soft skills (De Vos et al., 2021).

. Typically, hard skills are acquired through formal training and education, whereas soft skills are cultivated through personal experiences and reflection (De Vos et al., 2021). In the labor market, success for a young specialist hinges equally on both hard and soft skills. Nonetheless, students endowed with robust soft skills enjoy a competitive advantage over their counterparts during interviews, resume and cover letter creation, and securing their initial job placements.

Moreover, university graduates possessing specific professional knowledge and skills but lacking work experience encounter socio-psychological challenges when endeavoring to secure a workplace aligned with their preferences and ambitions. Many of them necessitate career

counseling services and psychological assistance. For successful employment, possessing a high-quality education and theoretical knowledge is inadequate. University graduates must also cultivate practical skills in communicating with employers, an understanding of the psychological intricacies of interviewing, proficiency in writing resumes and cover letters, and familiarity with current labor market trends and job search technologies.

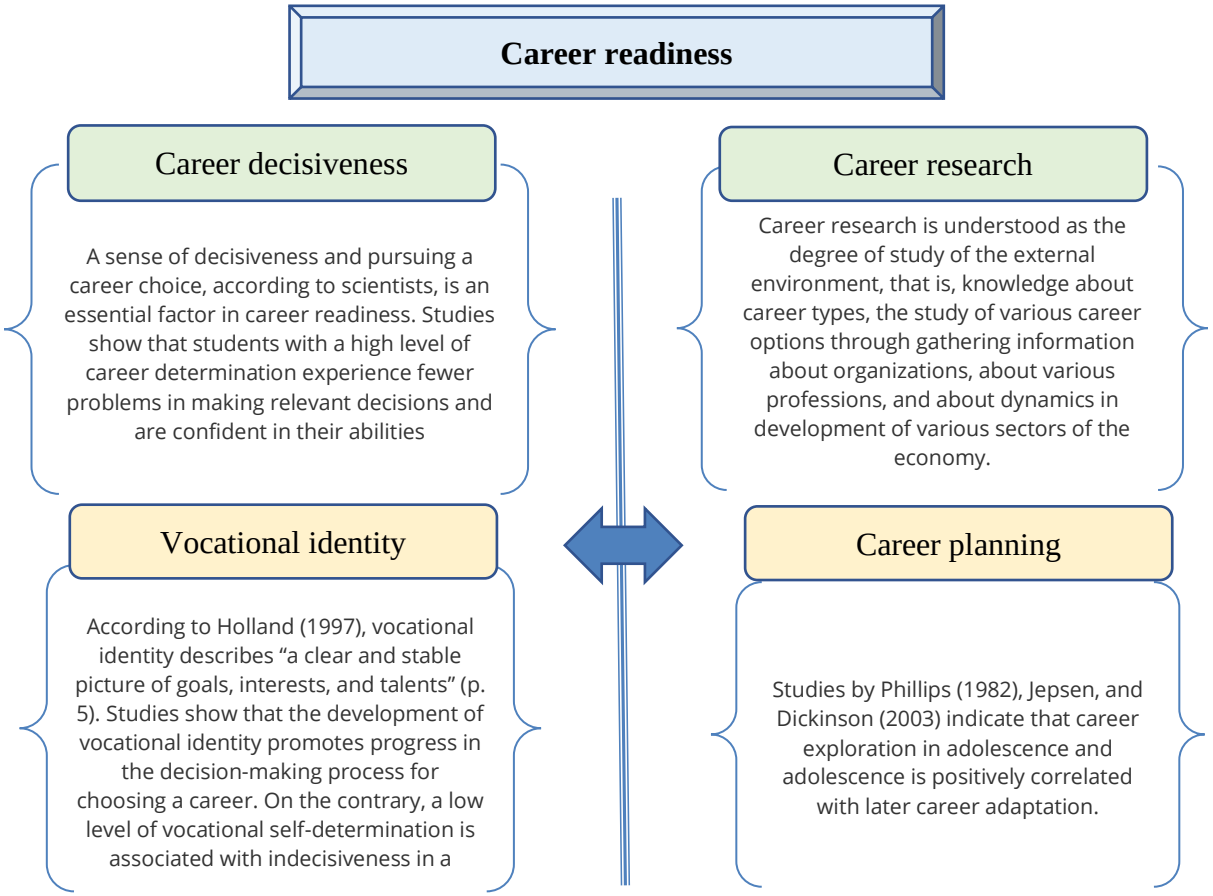
Consequently, the imperative task in higher education in Kazakhstan becomes the cultivation of vocational identity and psychological readiness for career decision-making among students.

The examination of career planning, readiness, and development has been thoroughly explored through well-established career development theories, such as Super's Theory, Bandura's Social Cognitive Theory, Holland's Theory of Vocational Personality, and the Theory of Career Construction. A comprehensive understanding of these established and contemporary career development theories is imperative for effective career counseling, contributing significantly to supporting students in their career progression.

Career readiness, as defined by most scholars, denotes the capacity to effectively engage in the process of career decision-making and make judicious career choices. Super asserted that youth exhibit varying levels of readiness for educational and future career. Super emphasized that this readiness should be rooted in the cultivation of essential attributes, encompassing attitudes toward career development, behaviors, and cognitions essential for the formation of a robust vocational identity (Super, 2021). In alignment with Super's theoretical framework, researchers have directed their attention to the structural elements of career readiness, encompassing aspects like attitudes toward planning, exploration, competencies in making career decisions, and the capability to gather information about professions and career prospects (Figure 1).

Figure 1

Components of students' career readiness according to Hirschi and Läge



Note: the figure was created by authors on the bases of literature review.

Bandura's socio-cognitive theory of career development revolves around the notion of self-efficacy, an amalgamation of an individual's knowledge and capabilities that influences subsequent professional actions. This theory aims to clarify the origins of interest in careers, the development of career plans, and the decision-making process, all rooted in an individual's perception of their abilities and skills. Bandura posits that self-efficacy is molded by past achievements, observations of others' reactions, and verbal and non-verbal beliefs. The Triadic Reciprocal Model of Causality within Bandura's theory posits that human efforts' outcomes comprise personal traits, actions and behaviors of individuals surrounding the person, and external factors.

Holland's Theory of Vocational Personality concentrates on vocational personality types as primary factors influencing career choice and development. Introduced in 1959, this early career development theory posits that career satisfaction is intricately linked to the alignment between an individual's personality and the work environment. Holland delineated six 'Holland Codes' or 'Holland Occupational Themes,' proposing that individuals with highly coherent and distinct personality profiles are likely to have more well-defined identities, make career decisions more effortlessly, and encounter enhanced stability in their career paths.

Career Construction Theory (CCT), a contemporary addition to career development theories, elucidates the interpretive and interpersonal processes through which individuals organize personal characteristics, establish directions for vocational behavior, and make sense of their careers. Though less prevalent in educational organizations for student career counseling, CCT is frequently applied to understand the complex experiences of full-time employed adults concurrently pursuing post-secondary degrees.

Social Cognitive Career Theory (SCCT), an extension of Bandura's social cognitive theory, was developed by Lent, Brown, and Hackett (1994). It asserts that personal characteristics, external circumstances, and overt actions interact to influence each other and foster development (Wright et. al, 2019). SCCT is often employed to scrutinize structural components such as self-esteem and self-confidence, delineate consequences, and elucidate connections between structures, interests, abilities, and aspirations. Acknowledging the dynamic nature of the world, SCCT contends that personal and professional changes are intertwined with technological advancements and globalization.

In summary, career readiness entails a strategic plan for career and personal development, encompassing beliefs, attitudes, motivation, emotions, abilities, behaviors, and actions conducive to successful career building. A successful career, by definition, aligns with individual expectations. Career counselors or those responsible for student career advising at universities should consider various career theories, as they provide diverse perspectives on addressing individuals' developmental needs, thereby contributing to the sustainability of career counseling services.

In the realm of Western education and psychology, the examination of career development and preparedness is conducted by employing career decision-making theories. These theories are grounded in methodologies that intricately model the complexities inherent in the process of career decision-making—an endeavor where individuals assess various alternatives with the aim of choosing the most desirable outcome (De Vos et al., 2021). As articulated by Kulscar and Gati (2020), career decisions encompass choosing an occupation, associated educational training, subsequent job selection, determining whether to remain in a job or transition to another, opting for formal and informal advanced training, and more. However, individuals often encounter difficulties during such decisions, hindering the decision-making process or leading to suboptimal choices.

Our examination explores models that explicate the intricacies of career decision-making processes, encompassing individual behavior patterns, the acquisition of information, challenges in dealing with indecision, career maturity, and adjustments to professional life. Present models conceptualize competencies in career decision-making as dynamic processes characterized by

specific levels and phases. Gati and Tal (2022) underscore particular decision points along the developmental continuum, offering a clearly defined framework that can be tailored to diverse situations.

The cognitive-informational process, as delineated by Sampson et al. (2014), delineates five crucial stages in the trajectory of career decision-making: communication (identifying a career problem), analysis (highlighting relationships between problems), synthesis (creating alternatives), assessment (evaluating priorities), and execution (developing strategies to make a choice). In the research conducted by Germeijs and Verschueren (2006), six distinct stages were identified as integral to the process of deciding on a career. Additionally, Esbroeck et al. (2005) proposed a dynamic model with six analogous stages in the context of career decision-making.

Gati and Tal's model, known as the 'Examination, In-depth Research, and Selection' model, presents a contemporary framework structured around three integral phases: considering potential alternatives based on individual preferences, engaging in in-depth exploration of effective alternatives, and ultimately selecting the most suitable alternative (Gati & Tal, 2022).

Hirschi and Läge (2017) pinpoint critical parameters for successful career development, emphasizing career decisiveness, planning, research, and vocational identity. These factors influence career readiness and manifest at various decision-making stages, directly impacting readiness levels. Low levels in any factor can hinder decision-making, potentially impeding the career paths of students and graduates.

There are many varieties of decisions. Most routine decisions have no long-term consequences, whereas those with long-term and significant consequences, such as having a child, are made infrequently (Gati and Kulcsár, 2021). Career decision-making extends beyond job selection; it involves understanding one's desires and needs, profound self-knowledge, and ideas about current and potential development. Gati et al. (2012) define career decision-making as the process individuals undergo when exploring career alternatives, comparing them, and making choices. Four key components characterize career decision-making competence: adequate confidence in the process, objective analysis of existing information, consideration of personal and others' experiences, and successful career decision-making.

Achieving success in becoming professionals may be impacted by various internal and external factors, both objective and subjective. Factors such as unwillingness to decide, lack of necessary information, and inconsistency in available information contribute to low competence levels in career decision-making, particularly among university students. Lack of motivation, indecision, and self-doubt may lead to an unpreparedness for decision-making.

Analyzing models proposed by Gati et al. (2012) and Hirschi et al. (2012), we identify specific difficulties categorized into ten main aspects. Difficulties may arise before the decision-making process (lack of readiness) or during the process (lack of reliable information or its absence). Hirschi et al. (2012) divide the six phases into three stages: before decision-making (phase 1), during decision-making (phases 2–5), and after decision-making (phase 6). Stepping in career may not cover every stage, and the process may not always yield effective solutions. Our study employs the model by Hirschi et al.(2012) to determine students' developmental phases and the structural model by Gati et al. (2012) for a comprehensive understanding of spheres involved in the process.

Student career counseling is pivotal in university operations, ensuring a smooth transition from studies to vocational life. Graduate employment rates often indicate the success of the university's educational programs, with the quality of employment being a crucial factor. In 2022, Toraighyrov University reported a reasonably high average employment rate of 80% for graduates. However, challenges arise when examining employment quality in specific programs, where rates fall below 50%. This study focuses on humanities and STEM specialties, specifically targeting programs with lower employment rates to identify students' career readiness levels and propose ways to enhance career development support at Toraighyrov University. The study aims to

ascertain the career decision-making phases students are in (bachelor's and master's degrees) and the primary challenges they encounter.

Methods and materials

The research was conducted between March and June 2023 at Toraighyrov University, a regional four-year institution in Kazakhstan. Data was gathered from two groups of students, namely undergraduates and graduates, through the utilization of online surveys. The participants (n=310) included third and fourth-year undergraduates (n=215) and graduate students (n=95). Purposeful sampling was utilized to ensure participants contributing rich and relevant content to the study (Patton, 2002). The average age of participants was 20 years, 5 months, with 55% male. Identified were 105 third-year students (34.4%), 110 fourth-year students (35.4%), and 95 graduate students (31.1%). The largest racial group was Kazakh (36%), followed by Russian (28%), Tatar (12.5%), Ukrainian (5.5%), German (5%), and multicultural or other (14%). (Table 1)

Table 1

Student Demographics

Major / Demographics	**STEM**	**Humanities**
Number	**177**	**133**
Gender		
Male	143	28
Female	34	105
Did not identify		
Age		
18–22	142	115
23–27	31	15
27–30	4	3
Did not identify	-	-
Nationality		
Kazakh	49	60
Russian	67	19
Tatar	18	21
Ukrainian	5	12
German	15	0
Other	23	21
Did not identify	-	-
Form of education		
Full time student	177	133
Previous education level		
High-school	80	96
College	97	37
Course		
3rd year	62	43
4th year	60	50
Graduate students (Masters degree)	55	40

Note: the table was created by authors.

Participants were selected through the psychology department of Toraighyrov University. All students at the university take a psychology course, either Leadership Psychology for undergraduates or General Psychology for graduate students. The survey took

1–1.5 hours to complete, and participants could choose between English and Russian. The surveys were anonymous, and participants could withdraw at any time.

Instruments included a demographic survey, the Six Phases of Career Decision-making (Hirschi& Läge, 2017), and the Career Decision Making Difficulties Questionnaire (CDMDQ) by Gati et al. (2020).

The demographic survey collected information on age, gender, nationality, major, form of study (full-time/part-time), and course/degree.

The CDMDQ aimed to understand students' needs and identified difficulties in career decision-making. It comprised three clusters: lack of readiness, lack of information, and inconsistent information and conflicts. The 32 identified difficulties were distributed across ten sub-scales, assessed on a 1 to 9 scale (1: does not describe me; 9: describes me well).

The Six-Phase Model of Career Decision-making determined students' stage in their career decision-making. The CDMDQ identified difficulties, while the Six-Phase Model determined the stage, with the sixth phase indicating complete readiness. This method offers practical applicability in career counseling (Sampson et al., 2014).

Results and discussion

Career Decision-making Difficulties Questionnaire (CDMDQ). The CDMDQ criteria were categorized into three groups based on difficulty levels: salient difficulty, moderate difficulty, and negligible difficulty (Hirschi, 2012). Higher scores indicated more difficulty, with a salient level correlated with scores from 9 to 7, moderate level from 6 to 4, and negligible level from 3 to 1.

Table 2 illustrates the results of undergraduate and graduate students for the 'Lack of readiness' (LR) cluster of CDMDQ. Both groups exhibited high levels of difficulties, with STEM majors scoring an average of 6.5 points out of 9 and humanities students scoring 7.03 points out of 9. The data suggests a sufficient level of motivation for career decision-making, coupled with a moderate level of difficulties related to dysfunctional beliefs. Notably, both STEM and humanities students faced salient difficulty in general indecisiveness, indicating a potential lack of skills development in career decision-making (Jepson and Dickson, 2011; Rochat, 2019).

Table 2

Analysis of results for the cluster 'lack of readiness' (CDMDQ) with distribution of results by difficulty levels (salient, moderate, negligible)

Levels	N	Motivation			General Indecisiveness			Dysfunctional Beliefs		
		Salient %	Moderate %	Negligible %	Salient %	Moderate %	Negligible %	Salient %	Moderate %	Negligible %
STEM	177	*16,16*	*36,52*	*47,32*	*38,92*	*46,10*	*14,97*	*21*	*56,70*	*22,3 %*
Humanities	133	*23,31*	*50,37*	*26,32*	*43,60*	*36,09*	*20,30*	*33.08*	*48,87*	*18,05*

Note: the table was created by authors on the bases of experiment

Table 3 presents the results for the 'Lack of information' (LI) cluster of CDMDQ. Both undergraduate and graduate students showed a moderate level of difficulties on average. This could be attributed to a lack of specialized courses guiding students on analyzing available information about their future occupations.

Moreover, students frequently face a deficiency of assistance when seeking supplementary information about their potential occupations and career prospects. The scale measuring 'lack of information about the self' revealed a moderate degree of challenges in

career decision-making, potentially attributed to participants having undergone a psychology course, which contributed to their self-awareness.

Table 3

Analysis of results for the cluster 'lack of information' (CDMDQ) with distribution of results by difficulty levels (salient, moderate, negligible)

	Profession	STEM	Humanities
	Levels		
Sub-scales	N	177	133
Lack of information about process	salient %	*29,35*	*34,58*
	moderate %	*54,91*	*51,12*
	negligible %	*15,74*	*14,2*
Lack of information about self	salient %	*49,10*	*36,09*
	moderate %	*33,54*	*44,41*
	negligible %	*17,36*	*19,5*
Lack of information about occupation	salient %	*36,52*	*48,36*
	moderate %	*44,32*	*32,85*
	negligible %	*19,16*	*18,79*
Lack of additional information	salient %	*34,73*	*38,33*
	moderate %	*42,52*	*38,36*
	negligible %	*22,75*	*23,31*

Note: the table was created by authors on the bases of experiment.

Table 4 illustrates the results for the 'Inconsistent Information (IC)' cluster of CDMDQ. Both groups demonstrated moderate difficulty levels in scales related to unreliable information and internal and external conflicts. Moderate levels on the 'internal and external conflicts' scale indicated challenges associated with societal demands faced by students when seeking employment.

Table 4

Analysis of results for the 'Inconsistent Information' cluster (CDMDQ) with distribution of results by difficulty levels (salient, moderate, negligible)

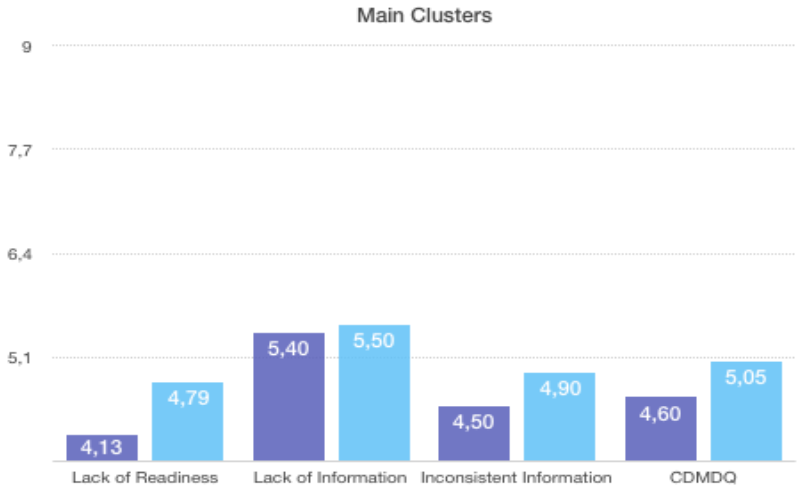
		Unreliable Information			Internal Conflicts			External Conflicts		
Levels	N	Salient %	Moderate %	Negligible %	Salient %	Moderate %	Negligible %	Salient %	Moderate %	Negligible %
STEM	177	*24,37*	*43,22*	*32,41*	*33,52*	*41,70*	*24,78*	*32,74*	*51,91*	*15,35*
Humanities	133	*33,33*	*38,36*	*28,31*	*44.08*	*39,87*	*16,05*	*32,58*	*49,22*	*18,2*

Note: the table was created by authors on the bases of experiment

Figure 2 indicates that the 'Lack of information' cluster presented the highest difficulties in career decision-making. The other two clusters showed average difficulty levels, suggesting the potential for enhancing readiness through focused short-term courses for both undergraduate and graduate students.

Figure 2

Comparative analyses of career decision-making questionnaire clusters



Note: the figure was created by authors on the bases of experiment

In the diagram results of two groups for CDMDQ 'Inconsistent Information' cluster are presented. Dark blue bar represents results of students majoring in STEM, light blue bar represents results of students majoring in humanities. Abbreviations: CDDMQ – total scores on the Career Decision-Making Difficulties Questionnaire

Six-Phase Model of Career Decision-making Questionnaire. Table 5 displays the distribution of participants across career decision-making phases, revealing distinctions between third and fourth-year undergraduates and graduate students. Over 50% of students, especially in the third year, are in the initial stages of career planning (phases 1, 2, and 3). Those in the second phase may not fully comprehend their strengths and weaknesses in the future occupation, while participants in the third phase lack sufficient orientation in the current labor market (Patton, M, 2002; Sampson et al., 2004).

The majority are in the fourth phase, utilizing career planning skills, with a smaller proportion in the fifth phase having defined their career choice but with unstable vocational intentions. Only 15% of graduate-level respondents and 7% of fourth-year undergraduates have reached the sixth phase, indicating fully developed career decision-making competencies.

Results highlight that a significant proportion of students (35% of fourth-year undergraduates and 47% of graduate students) are in the crucial fourth phase of career decision-making. This phase is fundamental for students graduating and embarking on their career paths. The sixth phase, representing a completely determined choice, has been reached by only 15% of graduate-level respondents and 7% of fourth-year undergraduates.

Table 5

Analysis of the Six-Phase Model of Career Decision-making questionnaire results

Career decision making phases	**1**	**2**	**3**	**4**	**5**	**6**
N=310	5%	15%	16%	39%	16%	9%
Third year (N=105)	11%	25%	21%	27%	12%	4%
Fourth year (N=110)	5%	16%	24%	35%	13%	7%
Masters student (N=95)	1%	5%	8%	47%	24%	15%

Note: the table was created by authors on the bases of experiment.

The impetus for this study emanated from an examination of the operational dynamics of the Upgrade Center at Toraighyrov University. Notably, post-graduation, students exhibit a proclivity for swift job changes, and, at times, even shifts in their chosen occupations, prompting an inquiry into the magnitude of this issue. This concern spurred our investigation, aiming to assess the gravity of the problem and formulate effective strategies to bolster students' career development (Taylor et al., 2018). The scrutiny of the University Career Center's operations, coupled with the outcomes derived from the CDMDQ and the Six-Phase Model of Career Decision-making Questionnaire, has empowered us to propose avenues for elevating students' career development trajectory (Taylor et al., 2018).

Utilizing the CDMDQ, we pinpointed specific domains necessitating cultivation through career support courses. It is evident that students either lack pertinent information or lack the proficiency to analyze and apply the information available to them regarding their future careers or professions. Consequently, internal impediments manifest among students, encompassing challenges in self-awareness and comprehension of their needs, strengths, and weaknesses (De Vos et al., 2021). Employing the Six-Phase Model of Career Decision-making Questionnaire, we observed that a majority of students in their final year of undergraduate studies possess foundational competencies in career planning but lack the skills requisite for lifelong career self-management. These revelations underscore the exigency for the development of a specialized career course aimed at honing career decision-making competencies among students. Such a course should be tailored to assist students in navigating opportunities within their prospective vocational domains.

Furthermore, we advocate for the augmentation of career counseling practices within the university. Individualized sessions should primarily concentrate on assisting students in delineating their strengths and weaknesses, as well as charting their intended career trajectories. It is imperative to instill in students lifelong skills that can be harnessed for job seeking and navigating career transitions. The prevalence of senior and graduate students equipped with advanced career planning skills would undoubtedly surge if student support were calibrated toward cultivating competencies integral to career decision-making. This pivotal period signifies when a substantial cohort of students should ideally possess a lucid understanding of their intended pursuits within the vocational realm and be poised for decisive career choices.

Conclusion

In conclusion, the investigation into the career development landscape at Toraighyrov University, prompted by observations at the Upgrade Center, has unearthed crucial insights. The propensity of students to undergo rapid job changes following graduation highlighted a significant concern, prompting a comprehensive examination of the issue. The deployment of tools such as the CDMDQ and the Six-Phase Model of Career Decision-making Questionnaire has been instrumental in identifying specific challenges faced by students.

The findings underscore the imperative of tailored interventions to enhance students' career development. The identified gaps, including a lack of information utilization skills and challenges in self-awareness, necessitate focused attention. The proposition for a specialized career course geared towards fortifying career decision-making competencies among students is grounded in addressing these specific needs. By cultivating skills related to information analysis, self-awareness, and strategic career planning, such a course aims to empower students for a lifetime of effective career self-management.

Additionally, the recommendation to augment career counseling practices within the university aligns with the identified challenges. One-on-one sessions focusing on students' understanding of their strengths and weaknesses, coupled with guidance on intended career paths, emerge as crucial. The envisioned approach seeks to equip students with essential

lifelong skills, ensuring their preparedness for job-seeking and adept handling of career transitions.

Ultimately, the proposed interventions aspire to elevate the overall level of career readiness among students. By addressing the root causes of career decision-making difficulties and providing targeted support, Toraighyrov University can better position its students for success in their chosen vocations. This strategic approach not only seeks to mitigate the observed challenges but also aims to foster a proactive and empowered student body capable of making informed and confident career decisions throughout their professional journeys.

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DESIGNING AND IMPLEMENTING APPLIED BACHELOR'S PROGRAM: A COMPREHENSIVE DEVELOPMENT MODEL

Abstract: Modern education faces the challenge of integrating theoretical knowledge with practical skills, which is particularly crucial for the training of mid-level professionals. Practice-oriented educational programs shorten the adaptation period for graduates and enhance their competitiveness in the labor market. Special attention is given to applied bachelor's programs that combine theory and practice, fostering rapid professional development of graduates.

The European higher education system offers short cycles leading to a bachelor's degree. The practical focus of these programs is ensured through partnerships between educational institutions and industry organizations, enabling students to develop the professional skills required by employers. This makes applied bachelor's programs key elements of educational reforms in the EU.

In Kazakhstan, applied bachelor's programs have not yet gained widespread popularity due to a lack of regulatory support, but successful pilot projects demonstrate the potential of this direction. These programs integrate theoretical and practical training, approaching education with consideration of real-world functional tasks.

The need to adapt educational programs to meet the current demands of the labor market is extremely important for preparing qualified personnel. This underscores the importance of continually improving educational initiatives to develop programs that successfully combine theory with practice and meet the needs of a dynamic economic environment.

Keywords: applied bachelor's degree, short cycle in higher education, model, educational program.

Introduction

Currently, there is a growing need for educational programs that can combine deep theoretical knowledge with the practical skills necessary for professional work. The main difference between such programs and traditional academic ones lies in their practice-oriented nature. This means that during their studies, students should have the opportunity to apply theoretical knowledge in practice and develop practical skills in real working conditions. This approach helps graduates adapt more quickly to the demands of work in organizations, reducing the need for a long adaptation period after graduation. These types of programs are known as applied bachelor's degree programs. They focus on closely linking theoretical education with practice, making graduates more attractive to employers and better prepared for professional activity.

In the structure of higher education qualifications in Europe, there are specializations aimed at the practical application of knowledge, which are implemented through programs leading to a short-cycle bachelor's degree (European Commission). Specifically, a short-cycle bachelor's degree is a qualification level that often takes less time to complete compared to a traditional bachelor's degree. These programs provide graduates with practical and applied

skills, enabling them to enter the labor market more quickly and begin their professional careers (Cedefop E., 2018). This approach makes education more flexible and oriented towards the immediate needs of the labor market.

The concept of applied bachelor's degrees in the context of short-cycle higher education in Europe is widely regarded as a means of rapidly and effectively addressing the need for highly qualified personnel to meet current labor market demands. Within the European Qualifications Framework, the applied bachelor's degree corresponds to levels 5 and 6, which confirms the recognition of these programs as a significant educational segment (European Commission, 2018). These educational programs are focused on providing students with specific professional knowledge and skills with an emphasis on the practical component, allowing them to become active participants in the workforce more quickly (EUA, 2023). For example, according to a study by the European Commission, applied bachelor's programs have become an important component of educational and professional system reforms in EU countries, contributing to the re-mobilization of knowledge and skills in line with the demands of the market economy (Markowitsch J., Hefler G., 2019).

Applied bachelor's degree programs in the context of short-cycle higher education in Europe strengthen the connection between educational institutions and local enterprises, ensuring the competitiveness of graduates in the labor market. These programs often collaborate with industrial partners, offering internships and projects that help develop skills in demand by employers (Hoeckel K., Schwartz R., 2010). In several countries, such as the Netherlands and Germany, applied programs focus on integrating theoretical knowledge with practical skills, enhancing the quality of specialist training (Teuber S., 2012). Specifically, a study by Eurydice found that graduates of applied programs demonstrate high employment rates (European Education and Culture Executive Agency, 2018).

In Kazakhstan's higher education system, applied bachelor's programs have not yet fully established their status and become widely recognized and standardized, as a stable system and regulatory framework for such educational programs have yet to be created. However, there is already experience and examples of implementing such programs within a pilot project.

The goal of the pilot project is to implement educational programs in which students simultaneously acquire practical skills directly related to their profession, typically characteristic of technical and vocational education, and deep theoretical knowledge and fundamental training, typical of higher education.

Materials and Methods of Research

This study utilized a variety of methods and materials, allowing for a comprehensive analysis of the implementation and realization of applied bachelor's degree programs. The surveys conducted and the data obtained on the practical aspects of the educational process provided a foundation for developing and proposing a model for designing and implementing applied bachelor's programs as a short-cycle higher education.

The survey data comprised the results of questionnaires and polls conducted among students, teaching staff, and employers involved in the pilot project. Data collection was carried out using online surveys that included both closed and open-ended questions. The data was processed using statistical analysis software.

In-depth interviews were conducted with program directors, instructors, and employer representatives to gain a deeper understanding of the experience of organizing programs and the educational process.

A comparative analysis of existing methodological approaches to creating educational programs was performed. Additionally, an analysis of the content of the educational programs developed within the framework of the pilot project was conducted, including a qualitative analysis of curricula and materials.

Results and Discussion

The implementation of applied bachelor's degree programs (short-cycle) at the higher education level was conducted in a pilot mode based on the order of the Minister of Science and Higher Education of the Republic of Kazakhstan No. 14 dated July 28, 2022.

According to this order, methodological recommendations were approved for admission to the pilot mode of training in applied bachelor's degree programs (short-cycle) at the higher education level. Eight higher education institutions (HEIs) and areas of training were defined within the framework of the pilot project, as presented in Table 1.

Table 1

Higher Education Institutions and Fields of Study in the Pilot Project

№	Code and Classification of Education Area	Name of Training Fields	Code and Name of Applied Bachelor's Program
L.N. Gumilyov Eurasian National University			
1	6B04 Business, Management, and Law	6B041 Business and Management	5B04104 – Accounting and Audit
M. Auezov South Kazakhstan University			
2	6B11 Services	6B111 Service Sector	6Br11101 – Tourist Business
Al-Farabi Kazakh National University			
3	6B06 Information and Communication Technologies	6B061 Information and Communication Technologies	5B06101 – Data Engineering
Karaganda Industrial University			
4	6B07 Engineering, Processing, and Construction Industries	6B071 Engineering and Engineering Affairs	5AB0710101 – Applied Bachelor's in Chemical Production, 5AB0710700 – Applied Bachelor's in Heat Power Engineering
	6B07 Engineering, Processing, and Construction Industries	6B071 Engineering and Engineering Affairs	5AB0710101 – Applied Bachelor's in Chemical Production, 5AB0710700 – Applied Bachelor's in Heat Power Engineering
D. Serikbayev East Kazakhstan Technical University			
5	6B07 Engineering, Processing, and Construction Industries	6B071 Engineering and Engineering Affairs	5B07101 – Transport, Transportation Equipment and Technologies, 5B07102 – Digital Agro-systems
	6B07 Engineering, Processing, and Construction Industries	6B071 Engineering and Engineering Affairs	5B07101 – Transport, Transportation Equipment and Technologies, 5B07102 – Digital Agro-systems
S. Utebayev Atyrau University of Oil and Gas			
6	6B07 Engineering, Processing, and	6B072 Production and Processing Industries	5B07201 – Oil and Gas Technologies

	Construction Industries		
M. Kozybayev North Kazakhstan University			
7	6B08 Agriculture and Bioresources	6B081 Agronomy	6B08101 – Agronomy
Satbayev University			
8	6B06 Information and Communication Technologies	6B062 Telecommunications	Telecommunication Systems and Networks

Higher Education Institutions (HEIs) within the pilot project have developed 10 applied bachelor's degree programs. The development and approval of these applied bachelor's programs were carried out considering the needs of the regional labor market and with the participation of stakeholders.

The applied bachelor's degree programs at HEIs were developed with two different durations: a three-year program consisting of 180 credits and a two-year program consisting of 120 credits. Following the implementation of the pilot project, a survey was conducted among students, faculty members, and employers to gather insights on the experience of organizing applied bachelor's programs at the HEIs participating in the pilot project. Based on the data obtained, a model for the development and implementation of applied bachelor's programs as a short cycle of higher education was created, as presented in Figure 1.

Figure 1

Model for the Development and Implementation of Applied Bachelor's Programs as a Short Cycle of Higher Education

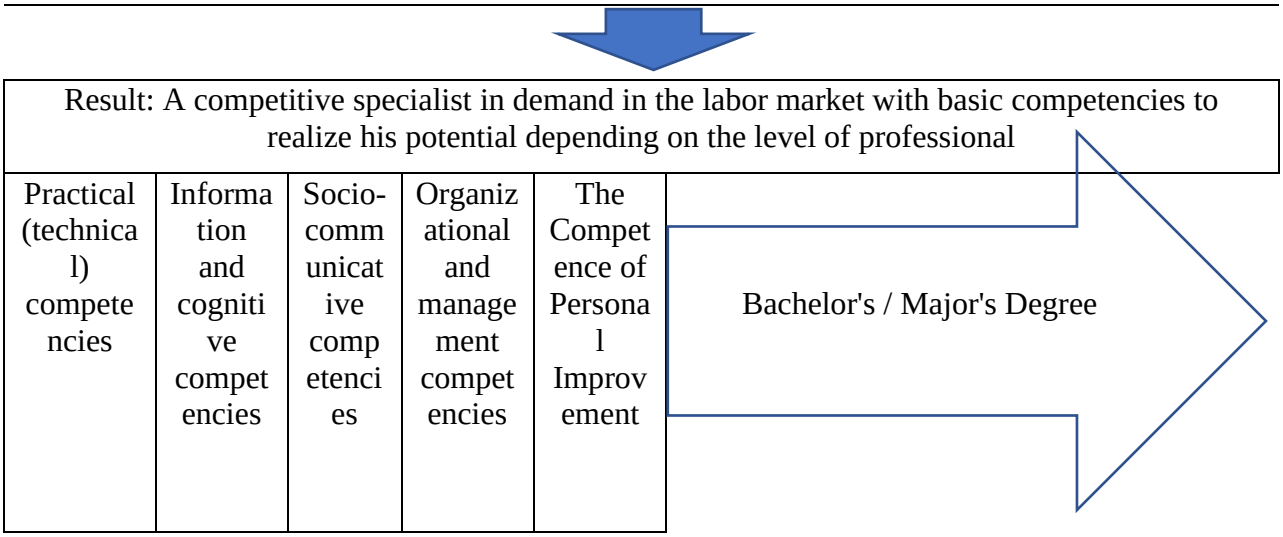
Methodological level	***Objective:*** To prepare competitive, practice-oriented specialists within the short-cycle higher education system for specific positions, equipped with professional knowledge, skills, and competencies that meet employer requirements.		
	Approaches:	*Patterns:*	*Principles:*
	- student-centered approach - practice oriented approach - competency based approach	1) **Dependence on Pedagogical Conditions** 2) **Sequential Nature, Implemented in Three Stages** 3) **Dependence on Applied Methods, Forms, and Resources** 4) **Dependence on the Unity of External and Internal Activities, Including the Activities of Educators and Students**	- integration of theory with practice - practical action of knowledge - individual approach to learning

Processual level	**Conditions for the Effective Organization and Implementation of Applied Bachelor's Programs as a Short Cycle of Higher Education**:		
	Theoretical preparation	*Practical preparation*	*Necessary resources*

	Basic Theoretical Knowledge of Core and Specialized Courses: Graduates need to possess a deep understanding of their subject area. This includes knowledge of key concepts, methods, theories, and trends within their chosen field.	- vocational fieldwork - work based learning - dual education - networked learning	- Educational program developed jointly with industry organizations - Contract with industry organizations - Material and technical base corresponding to the needs of the industry
	Stages of Development of Applied Bachelor's Programs as a Short Cycle of Higher Education		
	The purpose of the 1st stage is to request the partner's organization to train specialists within the framework of short-cycle programs	The goal of the 2nd stage is the joint development of the Applied Bachelor's Degree Program with the partner organization(s)	The goal of the 3rd stage is the practice-oriented training of an applied bachelor

	Form	*Methods*	*Means*
Instrumental level	Lecture Practical exercises Seminars Project activities Internship	**Case method:** Learning from real examples and cases that students may encounter in their future professional activities. **Interactive teaching methods:** They include the use of modern educational technologies, webinars, online courses and other means. **Study Tours:** Provide hands-on experience in a variety of learning environments and contexts **MOOC training:** Involves the use of various online platforms and resources to gain knowledge and study the subject in depth.	Educational program developed jointly with industry organizations; Contract with industry organizations; Material and technical base corresponding to the demand of the industry

Evaluation level	Monitoring the effectiveness of training applied bachelors in the framework of short-cycle higher education programs		
	Ways to monitor the effectiveness (quality) of training		
	Levels		
	Low	Average	High



As shown in the model, the main goal is to prepare a competitive, practice-oriented specialist within the short cycle of higher education for a specific position, possessing professional knowledge, skills, and competencies.

The analysis led to the conclusion that the feature of applied bachelor's programs is their increased practice orientation and the short time required to "produce" a specialist. To realize this feature, it is necessary to define a methodological basis, which in this model is represented by the following main approaches:

- Student-centered approach;
- Practice-oriented approach;
- Competency-based approach.

The distinctive feature of these approaches is the active involvement of students in the educational process, focusing on the practical application of knowledge and the development of specific competencies. These approaches make learning more targeted, allowing students to actively participate in their education, develop independent work skills, and apply acquired knowledge in practice. All three approaches aim to form not only theoretical but also practical skills necessary for successful work.

Therefore, the main principles of developing applied bachelor's programs are:

- Integration of theory with practice;
- Practical application of knowledge;
- Individual approach to learning.

To determine the interrelationship of various aspects of the educational process, its optimization, and improving its effectiveness at the methodological level, the following patterns were identified:

- Dependence on pedagogical conditions;
- Stepwise nature, implemented in 3 stages;
- Dependence on applied methods, forms, and tools;
- Dependence on the unity of external and internal activities, the activities of the teacher and the learners.

The uniqueness of these patterns lies in describing specific aspects of the educational process and emphasizing the importance of certain conditions, stages, methods, and interactions among participants in this process.

After determining the methodological basis, the model's structure provides for the creation of conditions for the effective organization and implementation of applied bachelor's programs as a short cycle of higher education. These conditions include theoretical and

practical training and the necessary resources for implementing the applied bachelor's program. The conditions also include stages of developing applied bachelor's programs as a short cycle of higher education, which allow identifying the real needs of the labor market and employers, ensuring future employment for students. Considering current employer requirements during joint development with stakeholders will enable building education with practical significance in mind. In training specialists, primary attention will be given to the practical part of education, allowing students to immediately apply acquired knowledge and skills in practice.

At the instrumental level of the model, the forms, methods, and tools of learning used in preparing applied bachelors are defined.

The feature of organizing the educational process in applied bachelor's programs is the use of various forms of learning that allow students to acquire knowledge and skills through diverse learning methods.

The methods presented in the model suggest learning through real examples and case studies, which will help students apply theoretical knowledge in practice. Interactive methods will create an educational environment that actively interacts with students and provides opportunities for active participation and direct interaction with the learning material. Educational trips expand students' professional skills. MOOCs provide access to online learning, expanding opportunities for in-depth study of the subject.

Learning tools consider labor market demands, ensuring the relevance of education, cooperation, and partnership for practical training and internships for students. The material and technical base, corresponding to industry requirements, will provide students with the necessary resources and conditions for learning and practical activities.

For the successful development and implementation of applied bachelor's programs as a short cycle of higher education, monitoring and evaluation of learning effectiveness are necessary. Therefore, the model includes an evaluative level, which allows for assessing and measuring students' competencies, as well as evaluating the effectiveness of the training program itself. Through the evaluative level, it is possible to check the achievement of set goals and respond appropriately to identified problems, making necessary adjustments to improve the quality of the educational process.

Such a model of integrating applied bachelor's programs into the higher education system will allow for the development and continuous updating of applied bachelor's programs, effectively preparing students for modern labor market needs.

Conclusions

In the modern world, there is a growing need for educational programs that combine deep theoretical knowledge with practical, relevant skills tailored to professional requirements. This need arises from the necessity for graduates to transition quickly into the workforce and adapt rapidly to workplace conditions. Applied bachelor's programs offer an optimal solution to this challenge by providing practice-oriented training and swift integration into the labor market.

In Europe, such programs have become an important component of the educational system, aligning with levels 5 and 6 of the European Qualifications Framework. They equip graduates with all the necessary tools for immediate professional activity. Research shows high employment rates among graduates of applied programs, making this approach an effective solution for both job seekers and employers.

In Kazakhstan, initiatives to implement applied bachelor's programs are also beginning to take shape, although there is still a need for the development of a stable regulatory framework and full recognition of this approach. Nevertheless, pilot projects are already underway, demonstrating positive results by integrating theoretical and practical training within higher education. The pilot project has shown that applied bachelor's programs can effectively meet the needs of the regional labor market. The developed model can serve as a

foundation for further scaling and standardizing applied bachelor's programs within the higher education system in Kazakhstan.

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