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FEATURES OF INFORMATION-BASED EDUCATIONAL PLATFORMS IN TEACHING TECHNOLOGY

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Abstract. *This article provides information about the characteristics of information-based educational platforms in teaching Technology, and explains that distance education is a new information technology and multimedia system, that modern means of communication and electronic publishing are an opportunity to eliminate the shortcomings of traditional forms of education (while preserving their advantages), and the article also analyzes specific aspects of education.*

Keywords: *distance learning, pedagogical technologies, methods, information, lesson, computer science, course.*

Introduction

Teaching technology is an integral part of the modern education system, which provides students with technological knowledge and skills to participate in social life. Today, the development of information technology creates the opportunity to introduce innovations in every field and use them effectively. Therefore, information literacy is of great importance in adapting students to the modern world, giving them the skills to search for, analyze, correctly and effectively use information sources. Information literacy is formed as a necessary skill not only within the framework of computer science, but also in the everyday life of every person. Improving information literacy in teaching this subject is important in preparing students for successful activities in the digital world.

The first distance learning course in the modern sense was introduced in the 1840s by Sir Isaac Pitman, who taught the shorthand system by sending texts copied into shorthand on postcards by mail and receiving transcriptions from his students in exchange for corrections. The element of student feedback was a significant innovation in the Pitman system. The scheme was made possible by the introduction of uniform postal rates throughout England in 1840. This initial effort was very successful, and three years later the Phonographic Correspondence Society was formed to organize these courses on a more formal basis. The society paved the way for the later formation of Sir Isaac Pitman Colleges throughout the country. The first correspondence school in the United States was the Society for the Encouragement of Home Study, founded in 1873. Wolsey Hall, Oxford, founded in 1894, was the first distance learning college in the United Kingdom.

During the COVID-19 pandemic, distance learning through video conferencing is increasing day by day around the world. In particular, in Russia and Italy, this is receiving more attention. The impact of the COVID-19 pandemic on education has certainly been, as the COVID-19 pandemic has led to the closure of most schools around the world. Many schools have switched to online distance learning through platforms such as Zoom, Cisco Webex, Google Classroom, Google Meet, Microsoft Teams, D2L, and Edgenuity. Concerns have arisen about the impact of this transition on students who do not have an internet-connected device or a stable internet connection. During the COVID-19 pandemic, distance learning has disrupted synchronous

learning for many students and teachers; When teachers were unable to teach in real time and were only able to transition to asynchronous learning, this had a significant and negative impact on their ability to navigate the transition and led to various legal issues, especially copyright.

A recent study on the advantages and disadvantages of online learning found that students had a harder time producing their own work. The study found that teachers reduced the amount of information taught and included more activities during the lesson so that students could create their own work. Internet technology has enabled many forms of distance learning through open educational resources and tools such as e-learning and MOOCs.

Although the expansion of the Internet has blurred the boundaries, distance learning technologies are divided into two delivery methods: synchronous learning and asynchronous learning. In synchronous learning, all participants are "present" in the virtual classroom at the same time, just as in traditional classroom teaching. This requires a schedule. Examples of synchronous technologies include web conferencing, video conferencing, educational television, direct broadcast satellite (DBS), internet radio, live streaming, telephone, and Internet-based VoIP.

Web conferencing software helps facilitate classroom meetings and typically includes additional interaction tools such as text chat, polls, hand-raising, emoticons, etc. These tools also support asynchronous participation by students who can listen to recordings of synchronous sessions. Immersive environments (notably SecondLife) have also been used to increase participant presence in distance learning courses. Another form of synchronous learning using a classroom is the use of robotic proxies, including those that allow sick students to attend classes.

In asynchronous learning, participants access course materials flexibly on their own schedule. Students do not have to be together at the same time. The oldest form of distance learning, correspondence, is an asynchronous delivery technology, and includes message board forums, email, video and audio recordings, printed materials, voicemail, and fax.

The two methods can be combined. A growing number of open universities and campus-based institutions use continuous or full-time teaching sessions to supplement distance learning. This mix of distance and campus-based learning has recently come to be known as "blended learning" or, less commonly, "hybrid learning". Many open universities use a mix of technologies and teaching methods (face-to-face, distance and hybrid) under the heading of "distance learning".

In the teaching of technology, information-based educational platforms increase information literacy among students, develop innovative thinking and modern technological skills, and enable the effective integration of information and communication technologies (ICT) into the educational process; they play an important role in distance learning, the use of multimedia materials, and preparing students for future professional activities.

The role of platforms in technology education:

• Information Literacy and Skills: Teaches students to analyze, evaluate, and use information effectively.

• Interactivity: Makes the learning process more interesting and effective, provides for the use of multimedia (images, video, audio) materials.

• Distance learning: Creates the opportunity to learn regardless of technological limitations, especially important in distance and hybrid learning.

• Innovative Thinking: Encourages design, problem-solving, and creative thinking.

• Personalized learning: Helps each student learn at their own pace and according to their interests.

• Didactic support: Helps teachers prepare teaching materials, conduct assessments (tests, etc.), and monitor student performance.

• Vocational training: Builds technological skills required in modern workplaces, making them competitive in the future.

Platforms, in general, are an important tool in transferring technological knowledge from theory to practice and transforming students into active members of the modern information society.

Distance learning can also use interactive radio instruction (IRI), interactive audio instruction (IAI), online virtual worlds, digital games, webinars, and webcasts, all of which are referred to as e-learning. Finally, distance learning, like any learning, involves a learning group, sometimes called a learning team, consisting of students, a teacher, and learning resources—books, audio, video, and graphic displays that allow the learner to read and access instructional content. Social networks on the Internet promote the idea of community building. On sites such as Facebook and YouTube, users create profiles, identify members they are connected to (“friends”), and create new communities of like-minded people.

In a distance learning setting, such a network can provide students with connections to one another, thereby reducing their feelings of isolation. Modern distance learning courses use web-based course management systems that include digital reading materials, podcasts (recorded sessions for electronic listening or viewing at the student's leisure), email, topic-based (linked) discussion forums, chat rooms, and quizzes. to obtain functionality in virtual (computer simulation) classrooms.

Both proprietary and open source systems are widely used. While most systems are typically asynchronous, allowing students to access most features at any time, synchronous technologies are also used, including live video, audio, and shared access to electronic documents at a specified time. Shared social spaces in the form of blogs, wikis (websites that can be edited by all participants in a class), and co-edited documents are also used in educational institutions, but to a lesser extent than similar spaces available on the Internet for communication. Along with the growth of modern institutional distance learning, there has been the emergence of Internet-based or facilitated personal learning services, including e-tutoring, e-coaching, and research assistance.

In addition, there are many educational companies that help parents select and connect with local tutors for their children. The use of distance learning programs and tutoring services has increased, especially among parents who homeschool their children. Many universities have some online tutoring services for remedial help in reading, writing, and basic mathematics, and some even have online tutoring programs to help doctoral candidates with their dissertations. Finally, many Internet-based personal assistant companies offer a range of services for adults seeking continuing education or professional development.

Online education is when teachers or students use educational tools available on the Internet. This means that students can use online tools even when they are physically in the classroom with their teacher and peers. Online learning can be used anywhere and at any time, so teachers can use them for students to prepare and complete assignments in class or at home. Online learning tools are often used in the classroom to create a blended learning environment. This helps to engage students in the lesson and the material.

Online learning also helps teachers save time preparing before class. With online learning tools, teachers can spend more time grading papers, giving students one-on-one attention, and even

finding time for themselves in their busy schedules. Distance learning does not involve in-person interaction with a teacher or peers. Students study independently at home, and learning is individualized and varies based on the pace and schedule of each student and their availability.

Distance learning actually relies on the teaching tools of online learning and hence there is some confusion between the two. It is also possible to study online with distance learning. In this sense, distance learning is a part of online learning.

Conclusion

Since distance learning is remote, it can connect students to universities all over the world, making it more accessible to students from different countries. It is also known to be less expensive, which is another factor that helps make education more accessible to many students around the world and at different socio-economic levels.

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TEACHING RADIATION PROCESSES IN MEDICAL HIGHER EDUCATION INSTITUTIONS: THE ROLE OF MEDICAL RADIOBIOLOGY, APPLICATION AND DEVELOPMENT OF RADIATION TECHNOLOGIES

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Abstract. *This article discusses the pedagogical and technological foundations for in-depth teaching of radiation processes to students in medical higher education institutions within the framework of the medical radiobiology curriculum. In addition, the paper highlights the role and significance of medical radiobiology in modern medicine, the integration of educational processes through an integral (integrative) learning module, and perspectives for the development of radiation medicine.*

Keywords: *medical radiobiology, diagnostics, therapeutic methods, modern medicine, radiation processes, dosimetry, radiation protection, teaching technologies, radiopharmaceuticals.*

Introduction

Teaching medical radiobiology in medical higher education institutions is of great importance. This discipline not only strengthens the theoretical foundations of medicine but also serves as a basis for understanding modern diagnostic and therapeutic methods. It should be emphasized that, in the process of mastering medical radiobiology, students of medical higher education institutions gain an increasingly profound understanding — through lectures as well as practical and laboratory classes — of the growing importance of radiation in modern medicine. Many advanced technologies used in diagnostics and treatment are based on the principles of radiation physics and biophysics. Therefore, providing future physicians with an in-depth understanding of radiation processes, elucidating the role of medical radiobiology in these processes, and analyzing the development of radiation technologies constitute a globally significant direction in contemporary medical education.

The role of medical radiobiology in teaching radiation processes. Medical radiobiology is a discipline that applies the principles of physics to the understanding of biological systems and processes. Radiation biophysics, in particular, studies the effects of ionizing radiation on biological objects, including changes at the cellular and tissue levels. For students specializing in medicine, an in-depth study of medical radiobiology is crucial for understanding the mechanisms of radiation processes (Table 1).

Understanding the molecular and cellular effects of radiation. The fundamentals of medical radiobiology help elucidate how radiation affects DNA, proteins, and other biological

macromolecules, as well as the mechanisms of cellular damage, mutations, and cell death. This knowledge provides a foundation for physicians to understand the pathogenesis of radiation-induced diseases and to develop effective treatment strategies.

Table 1. The main role of medical radiobiology in radiation medicine

Key concept	**Its role in medical radiobiology**	**Importance in medicine**
Ionization	Studies nuclear reactions and ionization processes	Forms the basis of nuclear medicine and radiation therapy
Cellular-level damage	Mechanisms of damage to DNA, proteins, and other cellular components	Understanding the effectiveness of radiation therapy in oncology and treating radiation injuries
Dosimetry	Studies quantitative measurements of radiation and its equivalent dose effects on biological objects	Determining safe and effective doses in diagnostic and therapeutic procedures
Radiation protection	Principles of protection (distance, shielding, time) and the radiation absorption properties of materials	Ensuring the safe handling of medical staff and patients

Dose–response relationships. Medical radiobiology examines the relationship between radiation dose and biological effect (dose–response curves). This is essential for clinicians in selecting minimal effective doses for diagnostic procedures and determining optimal doses in radiation therapy to achieve tumor control while minimizing adverse effects.

Fundamentals of radiation protection. Radiation biophysics provides a scientific basis for the principles of radiation protection — distance, shielding, and time. By understanding how radiation propagates and how it is absorbed by different materials, students learn to apply effective measures to protect both themselves and their patients from unnecessary exposure.

Application and development of radiation technologies in medicine. Radiation technologies have brought about a major revolution in medicine, a process that continues to this day. They encompass a wide range of applications, from diagnosis to treatment.

The following diagnostic technologies are widely used in modern medicine:

- **Radiography (X-ray imaging):** One of the oldest and most widespread methods, used to obtain two-dimensional images of bones, lungs, and other tissues;
- **Computed tomography (CT):** Utilizes X-rays to generate cross-sectional (three-dimensional) images of the body. New-generation systems, such as spiral CT and multislice CT (MSCT), improve diagnostic accuracy and examination speed;
- **Positron emission tomography (PET):** Uses radioactive isotopes to visualize metabolic processes in the body. It is often combined with CT (PET/CT) and is widely applied in oncology, as well as in neurology and cardiology;
- **Single-photon emission computed tomography (SPECT):** Assesses the functional state of organs based on the distribution of radioisotope tracers;
- **Radioimmunoassay (RIA):** A laboratory method used to determine the concentration of hormones, tumor markers, and other biologically active substances.

At the same time, the following types of therapeutic radiation technologies (radiation therapy) are extensively employed:

- **External beam radiation therapy:** High-energy radiation is directed at the tumor from an external source (e.g., linear accelerators). Modern techniques such as intensity-modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT) enable more precise dose delivery to tumors while sparing healthy tissues;
- **Brachytherapy:** Involves placing radioactive sources directly within or near the tumor. It is widely used in the treatment of prostate cancer, cervical cancer, and other malignancies;
- **Proton therapy:** An advanced form of radiation therapy that uses protons instead of photons. Protons deposit their energy at a specific depth (the Bragg peak), allowing maximal damage to the tumor while minimizing exposure to surrounding healthy tissues. This method is particularly effective in pediatric oncology and in the treatment of brain tumors;
- **Radiopharmaceutical therapy:** Delivers radioisotopes directly to tumor cells using carrier agents (e.g., monoclonal antibodies). Therapies such as **Lu-177-PSMA** are emerging as promising approaches for the treatment of prostate cancer.

Global and national research and comparative education systems. Research and educational systems in the field of radiation medicine are continuously evolving on a global scale.

Considering international experience, the following aspects deserve particular attention:

- **Research centers:** Countries such as the United States (MD Anderson Cancer Center, Mayo Clinic), Europe (Karolinska Institutet, CERN), and Japan (National Cancer Center) host major research institutions specializing in radiation biology, radiation oncology, and radiation epidemiology. These centers focus on identifying new biological effects of radiation and developing advanced methods for the diagnosis and treatment of radiation-induced injuries and diseases.
- **Educational systems:** In most developed countries, medical universities have dedicated departments or centers for radiation medicine, nuclear medicine, and medical physics. Education is structured progressively from undergraduate to master's, residency, and doctoral levels. Significant emphasis is placed on practical training and work in simulation-based learning centers. For example, in Europe, organizations such as the **European Board of Nuclear Medicine (EBNM)** and the **European Society for Radiotherapy and Oncology (ESTRO)** establish educational and professional standards for specialists in radiation medicine.
- **International collaboration:** International organizations such as the **International Atomic Energy Agency (IAEA)** and the **World Health Organization (WHO)** develop global standards for radiation safety and medical applications of radiation, support educational programs, and facilitate the exchange of specialists worldwide.

Table 2. Chronology of the development of radiation technologies in medicine

Years	**Discoveries and their applications**
1895	The discovery of X-rays
the early 1900s	The initial application of radiation therapy
the 1950s	The emergence of cobalt-60 therapy
the 1970s	The introduction of CT into clinical practice
the 1980s	The development of PET
the 1990s	IMRT and 3D-conformal radiation therapy
the 2000s	VMAT and PET/CT integration

the 2010s	The widespread adoption of proton therapy and advancements in radiopharmaceutical therapy

The situation in Uzbekistan and prospects for development. In medical higher education institutions in Uzbekistan, the fundamentals of radiation medicine are taught; however, their depth and level of integration have not yet fully reached those of leading developed countries.

- **Current status:** In medical universities under the Ministry of Health of the Republic of Uzbekistan, topics related to radiation diagnostics and radiation therapy are delivered by relevant departments. Courses on radiation safety are also included in the curriculum. Nevertheless, there is a need to place greater emphasis on the role of biophysics in understanding radiation processes and to increase the number and quality of practical training sessions (Figure 1).

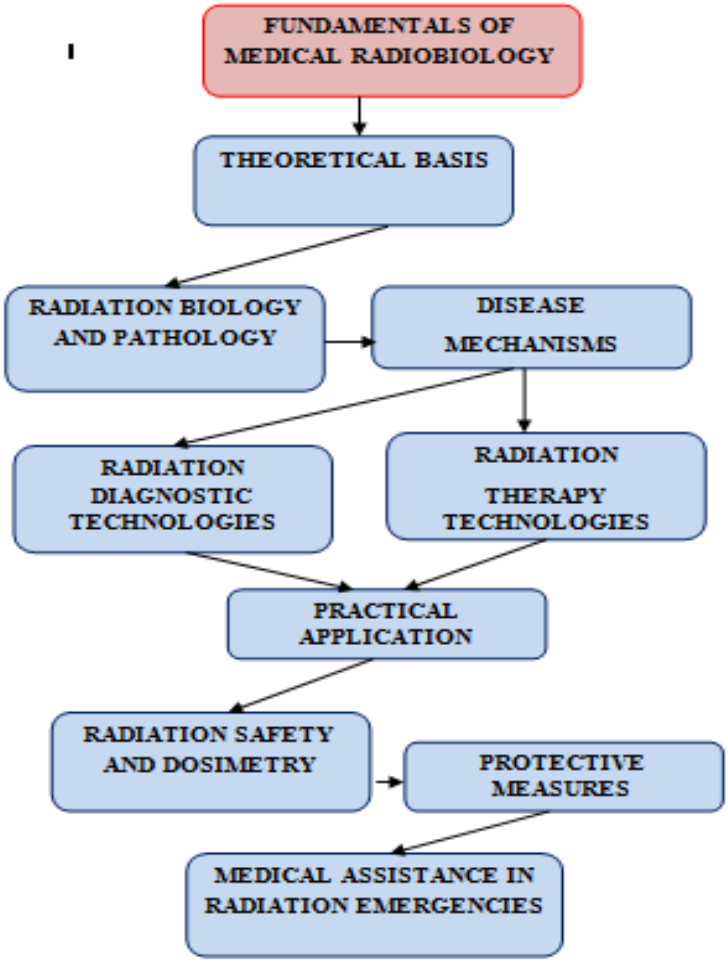


Figure 1. Model of integrating educational modules in teaching radiation processes.

Prospects for the Development of Radiation Education in Medicine

- **Modernization of curricula:** Introducing specialized, in-depth courses in radiation biophysics, radiation pathology, and radiation safety is a requirement of the times. These courses should include new methods of radiation therapy (such as proton therapy), advanced diagnostic techniques (PET/CT), and sections on radiopharmaceuticals.
- **Establishment of modern laboratories and simulation centers:** There is a need to create conditions for developing students' practical skills in working with radiation equipment, radiation dosimetry, and actions in radiation emergency situations.

- **Strengthening research capacity:** Supporting scientific projects in radiation medicine, radiation oncology, and radiation safety is essential. It is also necessary to develop systems of grants and scholarships to attract young scientists to this field.
- **Expansion of international cooperation:** It is advisable to establish joint educational programs, research projects, and faculty exchange with leading foreign universities and research centers.

Conclusion. In-depth teaching of radiation processes in medical universities, with an emphasis on the fundamental role of medical radiobiology, is an urgent requirement of modern medicine. The rapid development of radiation technologies necessitates continuous updating and the implementation of advanced practices in this field. The healthcare system of Uzbekistan should also prioritize the training of highly qualified specialists in radiation medicine in accordance with international standards. This will not only enhance patient safety and treatment effectiveness but also contribute to strengthening the country's scientific and technological potential.

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METHODOLOGICAL DESCRIPTION OF DEVELOPING STUDENTS' DIALOGIC AND POLILOGUE SPEAKING SKILLS IN ENGLISH

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Abstract. *This study investigates the methodological approaches to developing students' dialogic and polilogue speaking skills in English language teaching. Building upon the communicative approach, the study employs interactive teaching methods, role-plays, and collaborative group discussions to enhance oral communication competence. The experimental results demonstrate that these methods significantly improve students' fluency, lexical richness, and ability to participate effectively in multi-party communication. The study also provides pedagogical recommendations for the systematic integration of dialogic and polilogue activities in English courses.*

Keywords: *dialogic speaking, polilogue speaking, communicative competence, interactive methodology, oral communication, English language teaching.*

INTRODUCTION

Dialogic and polilogue speaking abilities are essential components in students' holistic development — encompassing personal, academic, and social dimensions. Contemporary pedagogical paradigms prioritize not only language knowledge but also the cultivation of communicative competence as a fundamental learning outcome. The educational phases of secondary and higher education provide optimal conditions to nurture these communicative skills, as students actively refine their cognitive, linguistic, and interpersonal capabilities [1]. In alignment with Hymes's construct, communicative competence is defined as the ability to employ language appropriately across social contexts, which is central to effective interaction [1]. Richards further asserts that interactive, task-based instruction facilitates learner engagement in both dyadic and group communications, enhancing fluency, confidence, and critical thinking skills [3].

Given globalization, English functions as both a linguistic medium and a strategic resource for academic and professional growth. Bygate emphasizes that interactive speaking tasks foster negotiation, turn-taking, and collaborative problem-solving aptitudes, which are indispensable for real-world communicative competence [6]. Uzbekistan's national educational policies—such as the 2023 "Program for Developing Socio-Communicative Skills in Education"—underscore the importance of embedding communicative and cooperative competencies into curricula, thereby establishing a framework for developing dialogic and polilogue oral abilities through contemporary pedagogies. This article aims to explore and analyze methodological approaches conducive to cultivating dialogic and polilogue speaking skills among English learners. It synthesizes global best practices and contextualizes them within local educational settings to provide actionable recommendations for enhancing oral communication capabilities in higher education.

LITERATURE REVIEW AND METHODOLOGY

The development of dialogic and polilogue speaking has been widely acknowledged as a foundational aspect of communicative competence in foreign language education. Hymes (1972) pioneered the view that effective communication transcends grammatical knowledge to include sociolinguistic, discourse, and strategic competencies [1]. This framework necessitates teaching strategies that enable authentic interaction, spontaneous response, and effective management of conversational exchanges. Building on this, Canale and Swain (1980) identified grammatical, sociolinguistic, and strategic competencies as critical for communication success, thus providing a theoretical basis for emphasizing dialogic and polilogue speaking in instructional contexts [2].

Richards highlights the efficacy of Communicative Language Teaching (CLT) and task-based interactive methods—such as role-plays, simulations, and discussion sessions—in facilitating active language production and oral skill acquisition [3]. Bygate demonstrated that structured, task-based speaking activities notably improve fluency, lexical usage, and interaction management, especially in group settings [6]. Savignon added that engagement in multi-party discussions and cooperative tasks enhances polilogue capacity, negotiation skills, and communicative self-efficacy, contributing positively to academic and professional communication [9].

Table 1: previous studies on dialogic and polilogue speaking

Rsearcher	Focus of study	Methodology	Key findings
Hymes D.	Communicative competence in language use	Theoretical analysis	Emphasized that effective communication requires sociolinguistic, strategic, and discourse competence, not only grammatical knowledge [1]
Canale M., Swain M.	Components of communicative competence	Conceptual framework, case studies	Identified grammatical, sociolinguistic, and strategic competence as essential for successful communication; foundation for dialogic speaking studies [2]
Richards J.C.	Communicative Language Teaching	Literature review, classroom observation	Highlighted the effectiveness of task-based and interactive methods for developing oral skills, including dialogue and multi-party communication [3]
Bygate M.	Speaking skills development	Task-based instruction, role-plays, peer interaction	Demonstrated that structured speaking tasks improve fluency, vocabulary use, and interaction strategies, particularly in multi-person discussions [6]
Savignon S.	Communicative competence in classroom settings	Classroom research, observation	Showed that multi-party discussion and collaborative tasks enhance students' polilogue abilities, negotiation skills, and confidence in oral communication [9]

This study employed a mixed-method approach incorporating analytical literature review, systematic classroom observations, surveys, interviews, and a quasi-experimental design.

Analytical methods involved critical synthesis of relevant theoretical frameworks related to communicative and group speaking. Observational data captured learner participation in dyadic and group-based communicative tasks including role-plays. Surveys and interviews with teachers and students assessed affective and behavioral dimensions such as communicative confidence and motivation. The experimental design involved an intervention group exposed to interactive methodologies contrasted with a control group receiving traditional grammar-focused instruction. Pre- and post-intervention assessments, coupled with observational checklists, objectively measured changes in dialogic and polilogue speaking abilities, ensuring a rigorous blend of theoretical underpinning and empirical validation.

RESULTS AND DISCUSSION

1.The experimental cohort exhibited statistically significant improvements across all measured domains. Dialogic speaking proficiency rose by 35 percentage points, indicating enhanced capabilities for spontaneous and coherent dyadic communication. Polilogue participation increased by 37 percentage points, reflecting improved management of multi-party interactions and responsiveness to diverse interlocutor perspectives. Vocabulary knowledge and speech fluency showed concomitant growth, signaling comprehensive gains in lexical repertoire, pronunciation, and syntactic accuracy.

2. Statistical Analysis

Paired sample t-tests were conducted to evaluate the significance of pre- and post-test differences. The results revealed that all gains in the experimental group were statistically significant ($p < 0.05$), while improvements in the control group, though present, were comparatively modest and not statistically significant in all indicators. This outcome reinforces the advantage of communicative, task-based methods over traditional grammar-focused instruction in promoting active oral engagement and real-life communication competence.

3. Qualitative Observations

In addition to numerical data, classroom observations and student reflections provided insight into behavioral and cognitive changes. Students in the experimental group:

Initiated and sustained conversations more confidently;

Asked and answered questions spontaneously;

Showed increased willingness to participate in group discussions;

Demonstrated effective turn-taking, negotiation of meaning, and clarification strategies;

Applied new vocabulary in context accurately and appropriately.

These qualitative findings support the quantitative results, illustrating that interactive methods not only improve measurable language skills but also enhance learner confidence, motivation, and communicative competence.

4. Comparative Insights

The control group, which followed traditional teaching methods, displayed some improvements in speaking skills, particularly in structured pair activities. However, these improvements were limited and less consistent across indicators. This suggests that passive, grammar-based teaching approaches do not provide sufficient opportunities for authentic oral interaction, highlighting the necessity of incorporating dialogic and polilogue activities to achieve meaningful communicative competence.

Table 2: Development of Dialogic and Polilogue Speaking Skills (%)

Indicator	*Experimental Group (Pre)*	*Experimental Group (Post)*	*Control Group (Post)*	
1	Dialogic speaking activity	44%	79%	53%
2	Polilogue participation	36%	73%	48%
3	Vocabulary knowledge	49%	81%	59%
4	Vocabulary knowledge	41%	76%	50%

The results of this study indicate that the systematic integration of dialogic and polilogue activities significantly enhances students' oral communication competence in English. Students in the experimental group demonstrated marked improvements in several key areas, including participation in conversation, fluency, lexical range, and the ability to manage multi-party interactions. These findings are consistent with previous research emphasizing the efficacy of communicative and interactive teaching methods in developing practical language skills (Richards, 2006; Bygate, 2005) [3; 6].

One of the most notable outcomes was the improvement in dialogic speaking skills, which involve direct interaction between two participants. Through pair discussions, question-and-answer sessions, and short role-plays, students developed the ability to respond spontaneously, clarify meaning, and maintain a coherent conversation. The interactive format encouraged active engagement and minimized hesitation, allowing learners to apply grammatical and lexical knowledge in meaningful contexts rather than in isolated exercises. This aligns with Hymes' (1972) concept of communicative competence, where the effective use of language in social interaction is a central component [1].

In terms of polilogue speaking, the study revealed that structured group discussions, debates, and collaborative problem-solving tasks enabled students to engage with multiple interlocutors simultaneously. This type of activity not only required students to express their opinions but also to listen attentively, negotiate meaning, and integrate the perspectives of others. Such experiences foster critical thinking, negotiation strategies, and cooperative communication skills, which are essential in academic and professional settings (Savignon, 2002; Littlewood, 2004) [8; 9].

The teacher's role emerged as a critical factor in the success of the methodology. In the experimental group, instructors acted as facilitators rather than mere knowledge transmitters. They provided guidance, scaffolded difficult tasks, and offered constructive feedback, encouraging students to take initiative in communication. This student-centered approach aligns with contemporary pedagogical theories, highlighting the importance of learner autonomy and active engagement in the language acquisition process (Ur, 2012; Scrivener, 2011) [10; 11].

Moreover, the study suggests that feedback and reflection are crucial in consolidating gains in both dialogic and polilogue skills. Observational notes, peer assessment, and self-reflection activities allowed students to identify strengths and areas for improvement, enhancing metacognitive awareness of their communicative strategies. Regular formative assessment ensured

that students remained motivated and could track their progress effectively, which is consistent with the principles of task-based language teaching (Bygate, 2005; Nunan, 1991) [6; 7].

It is also important to note that while the control group showed some improvement in speaking skills, the magnitude of change was significantly lower compared to the experimental group. This finding reinforces the limitations of traditional, grammar-focused teaching approaches in developing real communicative competence. Passive learning environments, which emphasize memorization and written exercises, often fail to provide opportunities for spontaneous language use and interaction, resulting in slower development of oral proficiency.

From a pedagogical perspective, these findings have several implications:

1. Curriculum design should incorporate structured dialogic and polilogue activities that reflect authentic communication scenarios.

2. Teacher training must focus on interactive teaching strategies, facilitation techniques, and methods for providing effective formative feedback.

3. Assessment frameworks should prioritize oral performance, communicative strategies, and interactional competence rather than solely written examinations.

4. Integration of reflective practice encourages students to self-monitor, develop critical thinking skills, and take ownership of their learning.

CONCLUSION

This investigation confirms that dialogic and polilogue speaking skill development is a critical element in fostering overall communicative competence in English language education. The evidence suggests that learner engagement in interactive, task-based, and role-play activities significantly enhances their capacity for authentic communication. The marked progress observed in fluency, lexical diversity, dialogic interaction, and multi-party communication within the experimental group corroborates the superior effectiveness of communicative methods relative to traditional grammar-centered approaches.

Furthermore, the study highlights the importance of integrating multi-level interactive activities into the curriculum. Dialogic activities, such as question-and-answer exercises and pair discussions, encourage students to respond spontaneously, articulate ideas clearly, and develop confidence in oral expression. Polilogue activities, including group debates and collaborative problem-solving tasks, promote higher-order communication skills, such as negotiation, argumentation, perspective-taking, and cooperative decision-making. Such experiences help students navigate complex multi-party interactions, which are essential for academic, social, and professional contexts [6; 9]. Another key insight is the role of teacher facilitation. The teacher's function shifts from simply delivering knowledge to guiding interactions, providing constructive feedback, and encouraging students to take initiative in communication. This student-centered approach not only enhances oral proficiency but also fosters learner autonomy, motivation, and critical thinking skills. The study also underscores the significance of systematic assessment and feedback. Regular observation, formative assessment, and reflective activities allow students to monitor their progress, identify areas for improvement, and develop strategies for effective communication. The combination of practical exercises with reflective learning ensures that gains in dialogic and polilogue competence are sustained over time.

In conclusion, the research confirms that a communicative, interactive, and task-based methodology is highly effective for developing dialogic and polilogue speaking skills among English learners. Implementing these strategies in English courses contributes not only to improved oral performance but also to the broader development of students' critical thinking,

collaboration, and confidence in real-life communication scenarios. These findings provide valuable pedagogical implications for curriculum design, teaching practice, and future research in foreign language methodology.

Ultimately, fostering dialogic and polilogue speaking competence equips students with the skills necessary to actively participate in diverse communication settings, enhancing their academic success, professional readiness, and lifelong language learning abilities.

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TRENDS IN THE PROFESSIONAL DEVELOPMENT OF TEACHERS IN THE CONTEXT OF MODERN EDUCATION

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Abstract. *A modern teacher must be well-versed in the various branches of science whose foundations they teach and understand its potential for solving socio-economic, industrial, and cultural problems. But this is not enough – they must constantly be abreast of new research, discoveries, and hypotheses, and perceive the immediate and distant prospects of the science they teach. The most general characteristic of a teacher's cognitive orientation is a culture of scientific and pedagogical thinking, the main feature of which is dialecticism. This is manifested in the ability to detect the contradictions that comprise every pedagogical phenomenon. A dialectical view of pedagogical phenomena allows teachers to perceive it as a process in which continuous development occurs through the struggle between the new and the old, and to influence this process by promptly resolving all issues and problems that arise in their work.*

Keywords: *personal and pedagogical values, ideological characteristics of a teacher's personality, pedagogy, psychology, education.*

Introduction

The Structure of Pedagogical Activity. Unlike the accepted understanding of activity in psychology as a multi-level system whose components include goals, motives, actions, and results, the prevailing approach to pedagogical activity is to distinguish its components as relatively independent functional types of teacher activity. N.V. Kuzmina identified three interrelated components in the structure of pedagogical activity: constructive, organizational, and communicative.

The successful implementation of these functional types of pedagogical activity requires the corresponding abilities, manifested in skills. Constructive activity, in turn, is divided into constructive-substantive (selection and composition of educational material, planning and constructing the pedagogical process), constructive-operational (planning one's own actions and those of students), and constructive-material (designing the educational and material base of the pedagogical process).

Organizational activity involves implementing a system of actions aimed at engaging students in various activities, creating a team, and organizing joint activities. Communicative activity is aimed at establishing pedagogically appropriate relationships between the teacher and students, other school teachers, community representatives, and parents. However, these components, on the one hand, can equally be attributed not only to pedagogical activity but to almost any other activity, while on the other, they do not sufficiently cover all aspects and areas of pedagogical activity. A.I. Shcherbakov classifies constructive, organizational, and research components (functions) as general labor functions, i.e., they are manifested in any activity[1].

However, he concretizes the teacher's function at the stage of implementing the pedagogical process, presenting the organizational component of pedagogical activity as a unity

of informational, developmental, orientational, and mobilization functions. Particular attention should be paid to the research function, although it is related to general work functions. Implementing the research function requires teachers to adopt a scientific approach to pedagogical phenomena, master heuristic search skills, and employ methods of scientific and pedagogical research, including analysis of their own experience and that of other teachers. The constructive component of pedagogical activity can be represented as internally interconnected analytical, prognostic, and projective functions. All components, or functional types of activity, are manifested in the work of a teacher of any specialty. Their implementation presupposes the possession of specialized skills by the teacher.

One of the most important requirements of the teaching profession is a clear social and professional position for its members. It is through this position that teachers express themselves as subjects of pedagogical activity. A teacher's position is a system of intellectual, volitional, and emotionally evaluative attitudes toward the world, pedagogical reality, and pedagogical activity in particular, which are the source of their activity. It is determined, on the one hand, by the demands, expectations, and opportunities presented and provided by society, and on the other, by internal, personal sources of activity—the teacher's drives, experiences, motives, and goals, their value orientations, worldview, and ideals. A teacher's position reflects their personality, the nature of their social orientation, and their type of civic behavior and activity. A teacher's social position grows out of the system of views, beliefs, and value orientations formed in comprehensive school [2].

During professional training, these foundations form a motivational and value-based approach to the teaching profession, the goals, and means of teaching. This motivational and value-based approach to teaching, in its broadest sense, ultimately manifests itself in a focus that forms the core of a teacher's personality.

A teacher's social position largely determines their professional position. However, there is no direct correlation, as education is always built on the foundation of personal interaction. This is why a teacher, while clearly understanding their actions, is often unable to provide a detailed explanation of why they act the way they do, often contrary to common sense and logic. No analysis can reveal which sources of motivation prevailed when a teacher chose a particular position in a given situation if they attribute their decision to intuition. Many factors influence a teacher's choice of professional position.

However, the decisive ones among them are his professional attitudes, individual typological features of personality, temperament and character. L. B. Itelson gave the characteristics of typical role pedagogical positions. The teacher can act as: an informant, if he limits himself to communicating requirements, norms, views, etc. (for example, one must be honest); a friend, if he strives to penetrate into the soul of the child; a dictator, if he forcibly introduces norms and value orientations into the consciousness of the pupils; an advisor, if he uses careful persuasion; a petitioner, if he begs the pupil to be like this, "as it should be", sometimes stooping to self-abasement, flattery; an inspirer, if he strives to captivate (ignite) the pupils with interesting goals, prospects. Each of these positions can give a positive and negative effect depending on the personality of the educator. However, injustice and arbitrariness always give negative results; playing along with the child, turning him into a little idol and dictator; bribery, disrespect for the child's personality, suppression of his initiative, etc.

The totality of professionally determined requirements for a teacher is defined as professional readiness for teaching. It legitimately includes psychological, psychophysiological,

and physical readiness, on the one hand, and scientific, theoretical, and practical competence as the foundation of professionalism, on the other. The content of professional readiness, as a reflection of the goal of pedagogical education, is summarized in a job description, which reflects the invariant, idealized parameters of the teacher's personality and professional activity. To date, extensive experience has been accumulated in constructing a teacher job description, which allows professional requirements for a teacher to be combined into three main, interconnected and complementary sets: general civic qualities;

Qualities that define the specifics of the teaching profession; specialized knowledge, abilities, and skills in the subject (specialty). When substantiating a job description, psychologists rely on establishing a list of pedagogical abilities, which represent a synthesis of the qualities of the mind, feelings, and will of the individual. In particular, V. A. Krutetsky identifies didactic, academic, and communicative abilities, as well as pedagogical imagination and the ability to distribute attention. A. I. Shcherbakov includes didactic, constructive, perceptual, expressive, communicative, and organizational abilities among the most important pedagogical abilities [3].

He also believes that a teacher's psychological makeup should include general civic qualities, moral-psychological, social-perceptual, individual-psychological characteristics, and practical skills: general pedagogical (informational, mobilizing, developmental, and orientational), general work skills (constructive, organizational, and research), communicative (communication with people of all ages), and self-educational (systematization and generalization of knowledge and its application in solving pedagogical problems and acquiring new information). A teacher is not just a profession whose essence is to transmit knowledge, but a lofty mission of creating personality, affirming the individual within.

In this regard, the goal of pedagogical education can be represented as the continuous general and professional development of a new type of teacher, characterized by: high civic responsibility and social activity; love for children, the need and ability to give them their heart; genuine intelligence, spiritual culture, the desire and ability to work collaboratively; high professionalism, an innovative style of scientific and pedagogical thinking, a willingness to create new values and make creative decisions; the need for and readiness for continuous self-education; physical and mental health, and professional performance. This succinct and concise characterization of a teacher can be further specified down to the level of personal characteristics. In a teacher's job description, the leading place is occupied by their personality orientation.

In this regard, let us consider the personal qualities of a teacher-educator, characterizing his/her social-moral, professional-pedagogical, and cognitive orientation. K. D. Ushinsky wrote: "The most important path of human education is conviction, and conviction can only be influenced by conviction. Any teaching program, any educational method, no matter how good it may be, that is not translated into the educator's convictions, will remain a dead letter, having no force in reality. The most vigilant control will not help in this matter. An educator can never be a blind executor of instructions: not warmed by the warmth of his/her personal conviction, it will have no power" [8].

In a teacher's work, ideological conviction defines all other personality traits and characteristics that express their social and moral orientation, including social needs, moral and value orientations, and a sense of public duty and civic responsibility. Ideological conviction underlies a teacher's social engagement. For this reason, it is rightfully considered the most profound and fundamental characteristic of a teacher's personality. A teacher-citizen is loyal to their people and close to them. They do not isolate themselves within the narrow circle of their

personal concerns; their life is continuously connected with the life of the village and city where they live and work.

A teacher's professional-pedagogical orientation plays a special role in their personality structure. It serves as the framework around which the key professionally significant personality traits of a teacher are assembled. A teacher's professional orientation encompasses an interest in the teaching profession, a pedagogical calling, and professional-pedagogical intentions and inclinations. The foundation of a teacher's pedagogical orientation is an interest in the teaching profession, which is expressed in a positive emotional attitude toward children, parents, teaching in general and in specific types of teaching, and a desire to master pedagogical knowledge and skills.

A vocation for teaching, unlike a pedagogical interest, which can be speculative, signifies an inclination that stems from a recognition of one's aptitude for teaching. The presence or absence of a vocation can only be revealed through the future teacher's involvement in academic or professionally oriented activities, as a person's professional destiny is not directly and unambiguously determined by their unique natural abilities. Meanwhile, a subjective experience of a calling for a current or even chosen activity can prove to be a highly significant factor in personal development, engendering a passion for the activity and a conviction of one's suitability for it. Thus, a vocation for teaching develops as a future teacher accumulates theoretical and practical teaching experience and self-assesses their teaching abilities. This suggests that deficiencies in specialized (academic) preparation cannot serve as grounds for declaring a future teacher's complete professional unsuitability. The foundation of a vocation for teaching lies in a love for children [5].

This fundamental quality is a prerequisite for self-improvement and the purposeful development of many professionally significant qualities that characterize a teacher's professional and pedagogical focus. Among these qualities are pedagogical duty and responsibility. Guided by a sense of pedagogical duty, teachers always strive to provide assistance to children and adults, to all who need it, within the limits of their rights and competence. They are demanding of themselves, strictly adhering to a unique code of pedagogical ethics. The highest manifestation of pedagogical duty is a teacher's dedication. It is in this dedication that their motivational and value-based approach to work is expressed. A teacher possessing this quality works without regard for time, sometimes even for their health. The life and work of A.S. Makarenko and V.A. Sukhomlinsky are striking examples of professional dedication.

An exceptional example of selflessness and sacrifice is the life and heroism of Janusz Korczak, a prominent Polish physician and educator who defied the Nazis' offer to let him live and stepped into the crematorium oven with his students. A teacher's relationships with colleagues, parents, and children, based on a sense of professional duty and responsibility, constitute the essence of pedagogical tact, which is simultaneously a sense of proportion, a conscious dosage of action, and the ability to control it and, if necessary, balance one means with another. A teacher's tactic, in any case, consists of anticipating its consequences, choosing the appropriate style and tone, time, and place of pedagogical action, and making timely adjustments [4].

Pedagogical tact depends largely on the teacher's personal qualities, their outlook, culture, will, civic position, and professional skills. It is the foundation upon which trusting relationships between teachers and students are nurtured. Pedagogical tact is particularly evident in the teacher's assessment and control activities, where particular attentiveness and fairness are crucial. Pedagogical fairness represents a unique measure of a teacher's objectivity and level of moral

upbringing. V. A. Sukhomlinsky wrote: "Fairness is the basis of a child's trust in their teacher. But there is no abstract justice—one that transcends individuality, personal interests, passions, and impulses. To be fair, one must thoroughly understand the spiritual world of each child" [9].

The personal qualities that characterize a teacher's professional and pedagogical focus are the prerequisite and concentrated expression of their authority. While other professions commonly use terms like "scientific authority," "recognized authority in their field," and the like, a teacher can possess a single, indivisible personal authority. The foundation of a person's cognitive focus is formed by spiritual needs and interests. One of the manifestations of spiritual strength and cultural needs is the need for knowledge. Continuous pedagogical self-education is a necessary condition for professional development and improvement. One of the main factors of cognitive interest is a love for the subject being taught.

L. N. Tolstoy noted that if "you want to educate a student through science, love your science and know it, and the students will love you, and you will educate them; but if you yourself do not love it, then no matter how much you force them to study, science will not produce an educational influence" [1]. This idea was also developed by V. A. Sukhomlinsky. He believed that "a master of pedagogy knows the ABCs of his science so well that in the lesson, during the study of the material, the center of his attention is not the content of what is being studied, but the students, their mental work, their thinking, the difficulties of their mental work" [9].

To understand the essence of professional and pedagogical culture, it is necessary to keep in mind the following provisions that reveal the connection between general and professional culture, its specific features:

• professional and pedagogical culture is a universal characteristic of pedagogical reality, manifested in different forms of existence;

• professional and pedagogical culture is an internalized general culture and performs the function of specific projection of general culture into the sphere of pedagogical activity;

• professional and pedagogical culture is a systemic formation that includes a number of structural and functional components, has its own organization, selectively interacts with the environment and possesses the integrative property of the whole, not reducible to the properties of individual parts;

• the unit of analysis of professional and pedagogical culture is pedagogical activity, creative in nature;

• the peculiarities of the implementation and formation of the professional and pedagogical culture of a teacher are determined by individual creative, psychophysiological and age characteristics, the established social and pedagogical experience of the individual.

Taking into account the specified methodological foundations makes it possible to substantiate a model of professional and pedagogical culture, the constituent components of which are axiological, technological and personal-creative. The axiological component of professional and pedagogical culture is formed by a set of pedagogical values created by humanity and originally included in the integral pedagogical process at the current stage of educational development.

In the process of teaching, teachers master ideas and concepts, acquiring knowledge and skills that constitute the humanistic technology of teaching. Depending on the degree of their application in real life, they evaluate these as more significant. Knowledge, ideas, and concepts that currently hold great significance for society and a particular educational system act as pedagogical values. Teachers become masters of their craft, professionals, as they master and

develop their teaching practice, recognizing pedagogical values. The history of school and pedagogical thought is a process of constant evaluation, rethinking, establishing values, and transferring known ideas and pedagogical technologies to new contextsThe ability to recognize something new in something well-known and to appreciate it is an essential component of a teacher's pedagogical culture. The technological component of professional pedagogical culture includes the methods and techniques of a teacher's pedagogical activity. The values and achievements of pedagogical culture are mastered and created by the individual through activity, confirming the inextricable link between culture and activity. The humanistic focus of pedagogical activity makes it possible to explore the mechanism for satisfying the diverse spiritual needs of the individual. In particular, how and in what way are the needs for communication, for acquiring new information, for sharing accumulated individual experience satisfied—that is, everything that underlies the holistic educational process—met [6].

Pedagogical activity is inherently technological. Therefore, an operational analysis of pedagogical activity is required, allowing us to view it as a solution to a variety of pedagogical problems. These include a combination of analytical-reflexive, constructive-prognostic, organizational-activity, evaluative-informational, and corrective-regulatory tasks, the methods and techniques for solving which constitute the technology of a teacher's professional-pedagogical culture. Pedagogical technology helps us understand the essence of pedagogical culture; it reveals historically changing methods and techniques, explaining the direction of activity depending on the evolving relations in society. It is in this context that pedagogical culture functions as a regulator, preserver, reproducer, and developer of pedagogical reality. The personal-creative component of professional-pedagogical culture reveals the mechanism for mastering it and implementing it as a creative act. The process of teacher appropriation of the pedagogical values developed occurs at the personal-creative level [10].

By mastering the values of pedagogical culture, teachers are able to transform and interpret them, which is determined both by their personal characteristics and the nature of their teaching. It is in teaching that the contradictions of creative self-realization are discovered and resolved, as well as the fundamental contradiction between the accumulated pedagogical experience of society and the specific forms of its individual creative appropriation and development, the contradiction between the level of development of the individual's strengths and abilities and the self-denial and overcoming of this development, and so on. Thus, pedagogical creativity is a form of human activity, the universal characteristic of which is pedagogical culture.

Pedagogical creativity requires teachers to meet their needs, possess specific abilities, demonstrate individual freedom, independence, and responsibility. It becomes clear that pedagogical culture is the sphere of creative application and realization of a teacher's pedagogical abilities. Through pedagogical values, the individual objectifies their individual strengths and mediates the process of appropriating moral, aesthetic, legal, and other relationships. In other words, by influencing others, the individual creates themselves, determines their own development, and realizes their potential through activity. An analysis of philosophical, historical-pedagogical, and psychological-pedagogical literature, a study of the experiences of school teachers, and theoretical generalizations allow us to conclude that professional-pedagogical culture is a measure and method of creative self-realization for the teacher in various forms of pedagogical activity and communication aimed at mastering and creating pedagogical values and technologies. The presented understanding of professional-pedagogical culture allows us to incorporate this concept into a categorical series: the culture of pedagogical activity, the culture of pedagogical

communication, and the teacher's personal culture. Professional and pedagogical culture represents a universal characteristic of various types of teacher activity and pedagogical communication, revealing and supporting the development of needs, interests, value orientations, and individual abilities related to pedagogical activity and pedagogical communication. Professional and pedagogical culture is a concept at a higher level of abstraction, concretized in the concepts of "culture of pedagogical activity," "culture of pedagogical communication," and "teacher's personal culture."

Pedagogical values are objective, as they are formed historically through the development of society, education, and the general education system, and are captured in pedagogical science as a form of social consciousness in the form of specific images and concepts. In the process of preparing for and implementing pedagogical activity, teachers master pedagogical values and subjectify them. The level of subjectification of pedagogical values is an indicator of the teacher's personal and professional development, their pedagogical culture as the degree to which they realize ideal values, transforming the potential (ought) into the actual (existent). As the conditions of social and pedagogical life change, and the needs of society, the school, and the individual evolve, pedagogical values also change and are re-evaluated. However, they serve as relatively stable guidelines by which teachers align their lives and teaching activities.

The integration of universal human values of goodness and beauty, justice and duty, equality and honor into a palette of pedagogical values, their mastery, and the deepening of the world of pedagogical values create the material foundation upon which the edifice of a teacher's professional and pedagogical culture is built. A teacher's subjective perception and appropriation of universal cultural and pedagogical values is determined by the richness of their personality, the focus of their professional activity, their professional and pedagogical self-awareness, and their personal pedagogical system, thus reflecting their inner world. In this regard, S. L. Rubinstein's assertion that value attitudes remain a means of reflecting reality in the human consciousness is correct. The degree to which an individual assimilates pedagogical values depends on the state of their pedagogical consciousness, since the establishment of the value of a given pedagogical idea or pedagogical phenomenon occurs through the process of its individual evaluation. The criterion for the evaluation and its outcome is a generalized image formed on the basis of psychological and pedagogical knowledge, the results of one's own activities, and a comparison with the activities of others. The images of individual pedagogical consciousness may or may not coincide with the ideas developed in society or a professional group about the goals, content, subject and object of pedagogical activity, about everything that ensures pedagogical competence and the appropriateness of the teacher’s activities [7].

A teacher's professional and pedagogical consciousness performs a complex regulatory function. It structures the entire diversity of acquired and implemented methods of educational, upbringing, methodological, and social-pedagogical activity around a single personal core. A. N. Leontyev notes that the subject's diverse activities intersect and are connected into nodes by the objective, inherently social relationships into which they necessarily enter. These nodes, in his opinion, form the "decoration of the personality" that we call the "I." The hierarchy of teacher activities stimulates the development of individuality. The teacher accumulates this diversity, being at the center of a uniquely structured and organized activity. In the process of their work, each teacher, as an individual, actualizes only that portion of their professional and pedagogical values that is vital and professionally necessary for them.

This characteristic of essential professional initiative is imbued in the teacher's consciousness in the form of the "professional self," which informs their individualized professional-pedagogical experience and associated experiences, beliefs, professional connections, and relationships. Professional consciousness is aimed at analyzing various aspects of the teacher's self and their professional activity and is intended to define the boundaries and perspectives of personal meaning, i.e., the internally motivated, individual significance of a given action or deed for the subject. It allows the teacher to self-define and self-actualize, ultimately addressing the question of the meaning of life. Representing not only a system of the most general judgments and knowledge about activity, oneself, others, and society, pedagogical consciousness is also the product and result of exclusively individual experience, a special mechanism for the professional development of the teacher's personality, allowing the universality of pedagogical culture to become an individual sphere of activity [6].

Pedagogical values, being the condition and result of corresponding activity, have different levels of existence: individual-personal, professional-group, and socio-pedagogical. Socio-pedagogical values reflect the nature and content of values operating in various social systems, manifesting themselves in the public consciousness in the form of morality, religion, and philosophy. They are a set of ideas, norms, and rules regulating society's activities in the field of education. Group pedagogical values represent a set of ideas, concepts, and norms regulating and guiding pedagogical activity within specific educational institutions. The set of such values is holistic in nature and acts as a cognitive-active system, possessing relative stability and repeatability. These values serve as guidelines for pedagogical activity in certain professional groups (school, lyceum, and gymnasium teachers; college, technical school, and university instructors).

Conclusion

Personal and pedagogical values are complex socio-psychological constructs that reflect the goals, motives, ideals, attitudes, and other ideological characteristics of a teacher's personality, constituting their system of value orientations. The latter, representing the axiological self, is given to the individual not as a system of knowledge, but as a system of cognitive formations associated with emotional and volitional components, accepted by the individual as an internal guide, motivating and guiding their activities. The consciousness of each individual teacher, accumulating socio-pedagogical and professional-group values, builds their own personal value system, the elements of which take the form of axiological functions. Such functions may include the concept of developing the personality of a specialist, the concept of activity, ideas about the technology of organizing the educational process in school, the specifics of interaction with students, their concept of themselves as a professional, etc. The integrative axiological function, uniting all others, is the individual's concept of the meaning of professional and pedagogical activity in the life of a teacher.

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GENERATIVE EFFICIENCY IN THE DEVELOPMENT OF THE HISTORICAL WORLDVIEW OF ACADEMIC LYCEUM STUDENTS IN THE CONDITIONS OF NEW UZBEKISTAN

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Abstract. *This article presents and analyzes scholars' scientific views on historical knowledge, levels of understanding the past in the development of historical worldview, methodological approaches to historical thinking based on these, the generative nature of historical knowledge, and the enhancement of skills.*

Keywords: *Integrative model, differential connections, historical worldview, historical event, integrativity, historical consciousness, historical thinking, evolutionary process, self-awareness, self-development, historical concepts, public reception offices, virtual reception offices.*

INTRODUCTION

When teaching history, the primary focus is on encouraging students to study factual data in this discipline, reflect on it, and express their attitudes, as well as ensuring the generative nature of learning tasks on the subject, which contributes to the formation of a historical worldview about the past. Along with this, the work of academic lyceum students with historical facts and information plays a crucial role in developing their historical perspective. Special attention is given to the historical worldview, drawing on the content of research by specialists in this field. In this regard, enhancing academic lyceum students' knowledge about the conceptual foundation of the distinctive structural semantics of worldview, historical worldview, historical thinking, and consciousness leads to increased effectiveness in learning.

METHODS. According to E. Yu. Semenova, "The study of worldviews, social attitudes, and behavioral practices is of great importance for determining the foundations of everyday life, since everyday life shapes worldviews and social attitudes, reflecting their components in the manifestations of life activities ”[1]. P. C. Seixas notes: "If history is truly a way of knowing the world, then through it we transform past events into a form meaningful to us in the present. In this process, students understand history as a process of acquiring knowledge, engaging in the mastery of primary and secondary information about the past ”[2].

“A worldview consists of one's attitude towards the surrounding world and existence, general ideas about the principles and foundations of life, the philosophy of human life, and the entire body of knowledge about it. Indeed, a person assimilates certain experiences through a scientific approach to life and observation, applies this knowledge, and becomes accustomed to repeating methods that have proven effective. In this sense, a worldview can be considered not as a logical system of a particular level, but as a product of a person's belief in existence and values ”[3].

“In society, special importance is attached to individual freedom. This contributes to the rapid enrichment of young people's worldview, which is developing ever more dynamically. The field of struggle for enriching and purposefully shaping worldviews is gradually transforming into

a significant ideological arena. Therefore, actively influencing the worldview of young people and educating them in the spirit of devotion to our ancestors and historical heritage remains an important task ”[1]. As M.M. Cochrane notes, ”If a historical worldview is combined with primary and secondary knowledge about the past, then primary and secondary knowledge depend on historical thinking. Historical arguments based on facts about the past are interpreted as concrete facts or concepts ”[1].

According to R. Ashby, P. Lee, and D. Shemilt, "students who perceive history as an activity based on the interpretation of facts can learn to use evidence as the foundation for their thinking ”[1]. There is a distinction between historical worldview and historical thinking, and they are considered as separately defined concepts. “According to M.S. Kagan, the universality of a worldview lies in the fact that it incorporates an individual component and is characterized by the use of both inductive and deductive reasoning ”[2]. According to Singer-Gabella, "effectively utilizing historical literature to adapt the expressed characteristics of generativity for the purpose of identifying generative tasks in history "[3].

RESULTS. The set of factors for generative tasks in the development of historical worldview includes:

- Forming conclusions based on historical sources and contextual data, developing a new historical worldview in students through historical reasoning that builds upon their previously acquired knowledge.

- Encouraging students to express their attitudes towards historical and factual perspectives by defining and memorizing their historical existence;

Joint analysis of productive ideas from works related to historical figures in the educational process, fostering students' creative abilities.

Consequently, the criteria for assessing contextualized functions in the model for developing the historical worldview of academic lyceum students in the context of New Uzbekistan are related to the deconstruction of the subject-subject structure and the interactive work between students and teachers.

The proportional approach to mentality in the development of historical worldview is characterized by the harmony between spiritual life and societal progress, and the alignment of social consciousness with social being.

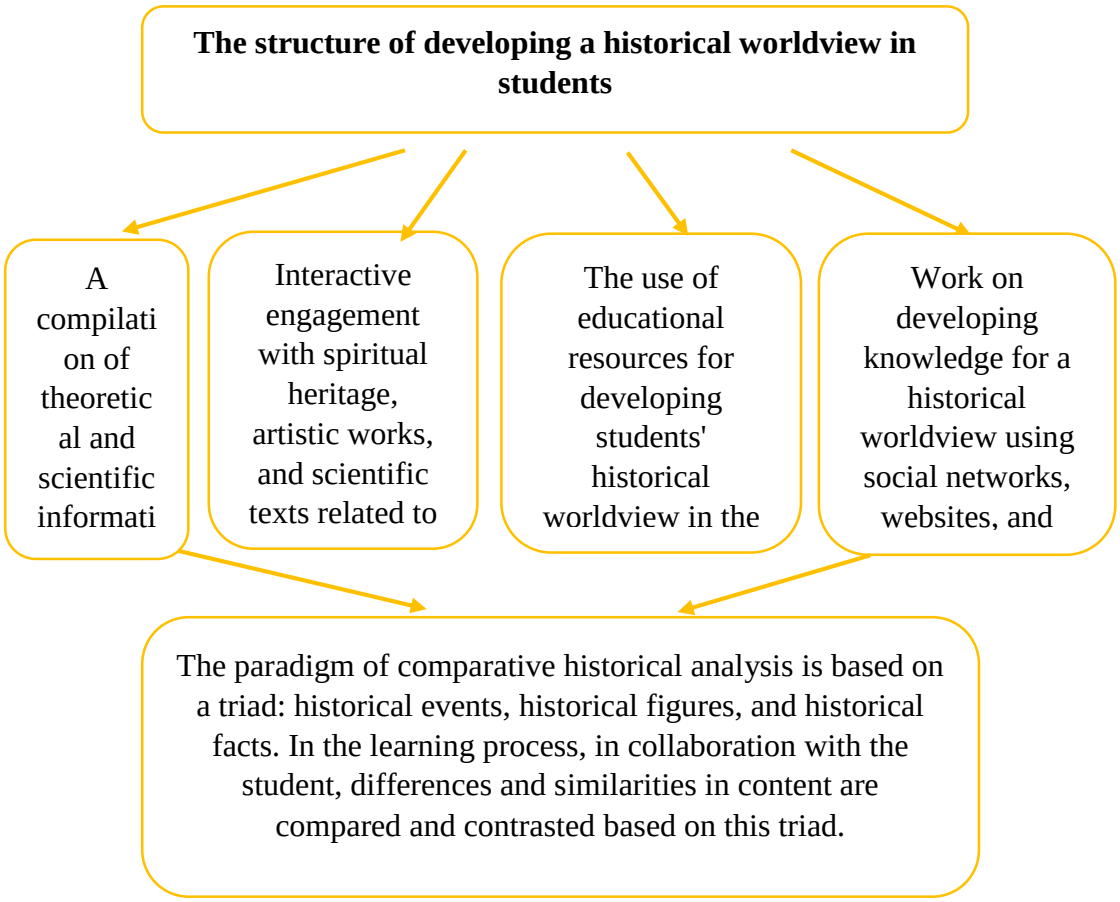
“Literature on historical worldview confirms that for the development of historical knowledge, it is crucial to understand central concepts (such as facts) and to become familiar with the methods historians use to investigate and interpret the past. This is achieved through studying a range of historical, scientific, and philosophical texts in the field of history” [5].

As part of our research, we have developed the evolution of historical worldview as a holistic structure based on methodological principles. The information in the textbook on historical worldview, the study of our ancestors' heritage, and the analysis of works and images created by creative figures allow for an in-depth examination of students' personal attitudes towards the reality under consideration and their independent analysis.

DISCUSSION. The paradigm of comparative-historical analysis - historical events - historical figures, historical facts: based on this triad, differences and similarities in content are compared and contrasted during the learning process in interaction with the student.

According to O.S. Porshneva, ”the methodological approach is fundamental in the study of mentality and historical worldview. Following the civilizational approach, researchers have viewed mentality as a subconscious part of the human psyche, separating it from social

consciousness and studying it in this capacity" [6]. According to M.S. Kagan, "Others, while studying historical processes related to the spiritual life of society, established the dependence of social consciousness on social existence" [7]



The theory and methodology of teaching history develop differentiated approaches in students of academic lyceums, guiding them towards understanding and comprehension of historical reality. "Recognition of the pattern and necessity of transitioning from the empirical level of understanding the historical process to the theoretical level of its comprehension and explanation." Methodological principles serve as methodological guidelines, especially when studying multifaceted problems [3]".

"Studying medieval society's understanding of historical reality, J. Le Goff emphasized that it reflects the unity of the material conditions in which members of this society live and the world of their perceptions" [6]. "A.Ya. Gurevich, applying a historical-anthropological approach, reanalyzed the ideas of medieval society and presented his comprehensive conclusions and solutions through the prism of his own reflections" [7]. "The combination of historical personality and historicity, along with the efficacy of scientific objectivity and systematic approach, represents an interpretation of the general problems of history as an amalgamation of worldview and its traditional philosophical components" [8].

CONCLUSION

Thus, the development of a historical worldview in students of academic lyceums is a valuable component that serves to advance their axiological, ontological, and cognitive approaches. At the same time, by examining the lives of historical figures, students cultivate a range of abilities, such as the capacity to emulate role models, reflect human qualities in relation

to historical realities, engage in self-development, and practice self-management - all of which manifest as intellectual growth.

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THEORETICAL AND METHODOLOGICAL FOUNDATIONS FOR THE DEVELOPMENT OF HISTORICAL STUDIES IN UZBEKISTAN

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Abstract. *This article examines the theoretical and methodological foundations of the study and research of scientific fields. Specifically, it evaluates methodological approaches to the study of the history of Uzbekistan in the 20th century, examining issues related to biased views on historical science and the falsification of history. It also analyzes approaches to the development of historical science during the years of independence, which have resulted in attempts to objectively study and create a history of the Motherland and advances relevant ideas.*

Keywords: *methodology, formational approach, civilizational approach, science, ideological views, development.*

Introduction

It is widely acknowledged that the modern world is developing based on fierce competition at every stage and in all fields. This extremely intense and fierce competition can only be countered by strong scientific potential, scientific achievements, innovative technologies, and their results in production and application in the social sphere.

Modern development poses a serious challenge for every state and nation: the development of fundamental and applied sciences in order to protect national interests and further strengthen the intellectual potential of society. "Developed countries around the world," says President Shavkat Mirziyoyev, "set themselves the goal of not only increasing production and bringing it to market, but also transitioning to an innovative economy based on deep knowledge and scientific achievements. That is, developing their economies not by squandering existing natural resources, but by creating and developing innovative products and introducing advanced technologies into production is becoming the primary driver of development" [1, p. 235].

At the current stage of social development, the role of science in ensuring a country's economic strength, political influence, and social diversity is becoming increasingly important. Rapidly advancing globalization and the rapid advancement of digital technologies and artificial intelligence associated with the Fourth Industrial Revolution pose enormous challenges for all sciences and fields of science, including the social sciences and humanities.

The reasons for this are, firstly, related to the policies of developed and advanced countries aimed at strengthening their dominance over other states, regions, and peoples in pursuit of their national interests. Secondly, they are directly consistent with changes occurring in the modern world, with the growing "improvement" of the spiritual and ideological worldview and the devaluation of ancient values.

It has been extensively argued that under such conditions, the role and influence of the social sciences and humanities are increasing. In this context, it is necessary to express some considerations regarding the methodological and theoretical foundations of studying the social

sciences and humanities. For example, in the "Explanatory Dictionary of the Uzbek Language," "methodology" is a Greek word defined as the science of learning, the scientific method, and the methods of individual sciences. "Method" is interpreted as a research method, a path, a way of understanding and studying natural and social phenomena [2, p. 583].

It should be noted that there is still no single, unified concept recognized by all researchers in the field of methodology. Although researchers pay attention to methodological issues in scientific research, almost all of them strive to select methods that are specifically suited to their study of natural and social phenomena, including historical events.

In our opinion, the theoretical conclusions presented in the "Encyclopedia of World Philosophy" on the issue of "methodology" can be considered to have a certain commonality. In particular, it is noted that "methodology" is 1) a set of research methods applied in a specific discipline; 2) a science, a study of methods. The concept of methodology has two main meanings: a system of specific methods used in an activity (in science, politics, culture, and art); and a study of a system or theory of methods. Methodology is also a field of scientific research that studies a set of methods and a type of activity. Methodology studies not only methods but also other means of supporting research. Such means include principles, rules, and instructions, as well as categories and concepts [3, p. 788].

While each individual science has its own research methodology, it is also necessary to consider the existence of concepts common to all scientific fields. Specifically, methodology is understood as a philosophical doctrine of principles that must be understood and taken into account when setting goals, finding solutions, conducting activities in various areas of life, as well as predicting, determining, and evaluating the results and consequences that accompany all of this.

At the same time, each study must have its own methodology for collecting, processing, analyzing, and summarizing primary data. In this sense, the method consists of setting a specific goal, defining objectives based on this goal, and finding ways to achieve them. As in all fields, it is necessary to define a system of principles essential to conducting scientific research in the field of history. This is necessary for defining the object and subject of the science, for the ability to look back on the past as a result of the research, for examining connections and interrelations, determining their significance, and for expanding the scope of application of the research results [4, p. 416].

During the years of independence, a certain focus was placed on the honest study of the methodology of the social and human sciences, particularly history, based on the principles of scientific rigor, impartiality, and accuracy. This allowed us to accurately apply the specific perspectives on the social and human sciences, particularly history, that had developed during the Soviet dictatorship.

In this context, it's important to note some considerations regarding the negative attitude toward science, especially history, during the Soviet dictatorship, such as the falsification of history and the deification of certain issues. President Shavkat Mirziyoyev, emphasizing the enormous role of history in national development and the education of youth in the spirit of boundless love for the Motherland, notes that the further development of this science seriously lags behind modern requirements. He emphasized that, although many years have passed since we gained national independence, even now, "scientific research on history is conducted primarily in a descriptive and journalistic manner. As a result, the essence of many events in our distant and recent past, the factors that caused them, and the laws of history remain unexplained. We all need to deeply understand one truth: national history must be transmitted to our people, especially our

youth, in the national spirit and must be ingrained in their hearts and minds. Otherwise, it will have no educational effect.

It is well known that our people have experienced many unforgettable events, both periods of victory and tragic days, throughout their ancient history. However, one truth must be emphasized: every state system, every social process that has existed on the territory of our homeland – be it victory or defeat, rise or decline – is the work of our people. It is an integral and inseparable part of the complex historical path we have traversed. That is why we must perceive all stages of our history as a whole and study them thoroughly from all angles [1, p. 275].

It is commonly assumed that current stage of social development, attention to our national history has begun to improve in a certain direction. This creates the opportunity to study topics that were once urgently needed but were forbidden. As a result of examining history as an example, a broad and comprehensive study of all periods and all scientific issues of our national history has begun, based on the principles of justice and science. One such scientific issue is the study of the history of science, which is an important aspect of our national history, particularly in higher education. However, before examining the current state of this scientific problem, we consider it important to reflect on its status during the Soviet dictatorship.

In the study of our national history, including the history of science, the work of the First President of the Republic of Uzbekistan, Islam Karimov, entitled "No Future Without Historical Memory," undoubtedly has significant theoretical and methodological significance. First of all, it is necessary to consider his reflections on science. "In general," says Islam Karimov, "I perceive science in the same way as the words progress, development, and advancement. I understand that the task of science is to determine the shape and direction of our future, to show where tomorrow will take us, the laws of nature, and what it will be like. It is necessary to prove and explain to people the advantages of independence, that a nation without independence has no future, that this is a law of nature. Science must be a force, a means of advancing the development of society" [5, p. 25].

The author notes in his work that the history of Uzbekistan in the full sense of the word was not actually created, and this was due to the political and ideological goals of Soviet ideology. Indeed, it can be said that the Soviet period, which lasted 74 years, was primarily a period of "experiments" in culture and education. It is well known that each stage in the history of the peoples of Uzbekistan, and in particular the history of the Uzbek people, is characterized in its own way: on the one hand, by unprecedented development in the socio-political, economic, spiritual, and ideological spheres, and on the other, by serious losses in these areas. These changes became especially dramatic due to the October Revolution. The October Revolution artificially blocked the ancient Eastern method of human development, almost halting it due to open discrimination. At the same time, the Eastern path had its own unique world. It was also distinguished by its important place in civilization, the existence of social justice, a political culture, unique democratic rules, and the prevalence of national and universal harmony in socio-cultural life.

It should be noted that the post-1917 period intensified the policy of distorting and falsifying the spiritual life and educational system of the Uzbek people, which had been shaped over millennia in the country's national history. One such example was the unification under the false banner of denying the deep roots of Eastern peoples, particularly Uzbek culture and education, and the elevation of peoples doomed to colonialism to the level of world civilization with the help of the invaders in order to strengthen their own political influence. The

disparagement of the educational system established in our country and the accusation of its one-sided development, particularly from a religious perspective, subsequently reached the level of public opinion in Uzbekistan. Political games, deception, and often direct pressure also led to a change of heart among some national intellectuals with weak faith. The October Revolution and its aftermath in Uzbekistan brought about significant changes in all aspects of the social sphere. On the one hand, the Bolsheviks, through the active introduction of class, ideological, and party principles into culture and education, embarked on the path of Sovietization and politicization of all public life. On the other hand, "Proletkultists" and "Roppovists" emerged under the banner of a "new," "separate" public life.

During this period, spiritual life was built on the foundation of a relentless struggle between the Bolshevik "new" and the local and national "old." To achieve this goal, from the very first days of the establishment of the Soviet regime, the Bolshevik Party pursued a policy aimed at ensuring its transformation into the sole, dominant party, combating all theories and ideas alien to its policies and eliminating their influence. The Soviet state's efforts to eradicate illiteracy among the population of Turkestan, build schools, develop higher education, and train specialists were aimed not at the interests of the local population, but rather at re-educating the country's population in the "communist spirit" and shaping them into "worthy" socialist specialists through cultural and educational means. The goal was to eradicate illiteracy among the population of all ages and teach them the "alphabet of communism."

The above-mentioned considerations and thoughts indicate that Soviet-era ideology, by every means possible, accused the population of illiteracy and lagging behind world civilization, and as a result, led them to new stages of development. Moreover, this ideological perspective dominated all works produced during the Soviet dictatorship. Attempts were made by every means possible to Sovietize the local population and instill in them all the elements of communist ideology.

It has been well documented that almost all works created at that time deified Soviet ideology, while our own path to national development, shaped over millennia, was denigrated. “The above considerations naturally raise the following question,” says the First President of Uzbekistan, Islam Karimov, “have we created a true history of Uzbekistan and the Uzbek people today, one worthy of being shared with the general public? I do not consider history written during the Soviet era to be history. I am categorically opposed to teaching history written by others. When did the colonizers ever express an honest, fair opinion of the people they subjugated? They expended all their energy on belittling Turkestan’s past, on depriving us of our history. You probably know very well what it means to be deprived of history. For a person, to be deprived of history means to be deprived of life” [5, p. 10].

The 1920s and 1930s were an extremely difficult period, and despite the dominance of Bolshevik ideology, the national intelligentsia strove to demonstrate its abilities in all areas of science, education, and culture. This was especially true of science and education, which were important factors in changing people's minds. In the early years, certain democratic principles existed to a certain extent in the social sphere, particularly in the management of science and education, and the authorities were forced to take into account local customs and peculiarities. Later, as administrative-command methods spread and consolidated, the pursuit of common indicators, the Bolshevik path, and the methods of the "cultural revolution" became dominant. In this area, the formation of new cadres and the elimination of the old national intelligentsia were carried out with these goals in mind. The increase in literacy, the strengthening of the bureaucratic

system of governance, the transition to technical development, and the creation of scientific institutes occurred simultaneously with the establishment of strict ideological control over them [6, p. 243].

Although the process of ideologizing the social and humanities spheres and instilling the "advantages" of pseudo-socialism into the public consciousness intensified throughout the Soviet era, the 1980s became particularly acute in this regard. In particular, contradictory situations in science and education intensified.

There were several reasons for this. Firstly, by this time, the Soviet state had begun to lose all its potential. Extensive development was no longer viable, and the closed nature of the Soviet state and the lack of strong integration with the world prevented the use of intensive approaches. On the other hand, the primary goal in science and education was to satisfy the economic and material interests of the former center. Therefore, by any means necessary, the primary focus was on extracting as much material goods and wealth as possible from the national republics, including Uzbekistan. The priorities of science, including the higher education system, in scientific fields were determined by the extent and speed with which the former central needs of this field could be met.

On the other hand, the position of the social sciences and humanities in the higher education system had become even more pressing by this time. Soviet ideology and the ideological foundation of the system were unable to cope with the global competition of the time. Therefore, the social sciences and humanities were required to even more clearly demonstrate the "advantages" of the Soviet system, proving by any means necessary that socialism was the most just and humane state in the world. Scholars and specialists labored to disprove these false ideas. As a result, the resulting "works" found no place in the public sphere, and the general public rejected them.

As a result, the "advantages" of socialism, new methods and ways of conducting social and spiritual life began to be deified. During the "reconstruction" period, scholars and specialists were granted a certain degree of scientific and creative freedom, and initiative was permitted. Although it seemed possible to address previously impossible, "closed" topics, ideological certainty prevented such work from being carried out in practice. However, the bold efforts of leading intellectuals, scientists, and academics were viewed as hostile to the Soviet regime. Another reason for this was the form-building approach to assessing historical events, which developed during the Soviet era and fundamentally contradicted the development of the scientific field, especially research in the interests of the state, making it a methodologically flawed approach.

The process of scientific research reveals that in the study of historical processes, there exist civilizational and form-building approaches. The form-building approach achieved a dominant position in Soviet history under Marxism-Leninism. It stems from the category of "socio-economic formation"—the type of society at a particular stage of development. According to this doctrine, the material factor in the development of society is material production. The mode of production includes productive forces and production relations. The material life of society is primary, and social thought is secondary.

According to proponents of this approach, Marxist-Leninist doctrine is the key to understanding the unity and diversity of human history. The successive succession of social formations constitutes the main direction of human development. The transition from one socio-economic formation to another occurs through social revolutions. The emergence of a new formation is determined by the victory of the ruling class, which carries out revolution in all

spheres of life. Marxist theory places particular emphasis on revolution and class struggle. The primary driving force of history is class struggle [7, p. 57].

It should be remembered that the formalist approach to the study, analysis, and scientific, truthful conclusions about historical processes played a negative role in our national history. The most regrettable aspects of this approach were that it relegated the individual, the subject of history, to a secondary place and generally downplayed the role of the spiritual factor. Another regrettable aspect of this approach was its emphasis on the role of revolutionary situations and violence in historical processes. All this ultimately led to the development of scientific fields in Uzbekistan, including the higher education system, in a manner that denied national identity, even to the point of denying the past culture, educational system, and national-cultural and scientific heritage created by Central Asian thinkers and scholars. The formative approach created an atmosphere of suppression of our national intelligentsia and the glorification of scientists, primarily of the Soviet era.

In historical science, the civilizational approach, in turn, contradicts the formative approach. It should be emphasized that the civilizational approach to historical processes is considered to have emerged in the 18th century, primarily in Europe. However, it should not be forgotten that the civilizational approach was developed much earlier in the East, in particular by Ibn Khaldun (1332-1402). Abdurrahman ibn Muhammad ibn Muhammad Abu Zayd ibn Khaldun first presented a systematic view of civilization in his multi-volume work "Muqaddima." The author calls "civilization" "umran." He believes that the inner meaning of history involves reasoning and the pursuit of truth, requiring a subtle analysis of the causes and origins of existing things, as well as a profound study of how and why events occurred. Ibn Khaldun also emphasizes the absolute impossibility of taking sides in the study of history. Taking sides and displaying a particular bias blinds insight, weakens critical judgment, and hinders research. As a result, false information is accepted and disseminated.

The author understands history as a narrative about human society, which by its very nature is considered a world civilization. Warning historians, Ibn Khaldun writes: "If a historian accepts information directly and is unaware of the ordinary laws of those historical situations, the rules of politics, the nature of civilizations, or the circumstances that determine the reality of human society, and does not compare distant or ancient information with recent or contemporary information, then it is quite likely that he will encounter errors" [8, p. 61].

The advantages of the civilizational approach to the study of historical events lie in the fact that its principles can be applied to any state or group of societies. It does not deny, but rather affirms, the unity and integrity of human history, takes into account the contribution of each people to world civilization, and emphasizes the importance of moral, spiritual, and intellectual factors in historical processes. As noted by prominent scholars S. Shodmonova and M. Yuldashev, the civilizational approach to historical processes is the study of a holistic social system that unites various interconnected elements (religion, culture, economics, politics, and social structure). Although civilization undergoes certain changes as a result of certain external and internal influences, its inner core remains unchanged. This approach to civilization is reflected in the theory of its cultural-historical types. Cultural-historical types are understood as societies with a defined territory and characteristics of cultural-social development [7, p. 65].

Conclusion.

In conclusion, it should be noted that the effectiveness of research in any field of science and the methodology for achieving the stated goal are of great importance in the study of scientific

fields. The correct approach to the study of science results in scientific innovations that can have a positive impact on the development of society. In this regard, we can see from history that the correct choice of methodological approaches is important when studying areas of science related to the national values of the people. As a result of the reforms carried out in the study of history after Uzbekistan gained independence, historical science in Uzbekistan has taken its place in world civilization based on new views and approaches.

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PROFESSIONAL COMPETENCE OF A FUTURE TEACHER OF THE SUBJECT "TECHNOLOGY" IN ORGANIZING WORK OUTSIDE THE CLASSROOM AND OUTSIDE THE SCHOOL

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Abstract. *Each person manifests himself differently as a person. He differs in his character, interests and abilities, level of mental development, needs and attitude to labor activity, there are specific characteristics of a person, and when these spiritual characteristics have developed and reached a certain stage, he is called a perfect, mature person.*

Keywords: *personality, technological education, class, training, development, process, activity.*

Introduction: In order for a person to be called a person as a social being, social and economic life and upbringing are necessary, therefore, the science of pedagogy should determine the laws of the child's development as a person, his comprehensive maturation, the objective and subjective factors affecting him, the periods related to the development processes, based on this, the science of pedagogy should also determine the stages of education, upbringing and child activity, self-education in the development of a person. What is development? A person is a living biological being.

Therefore, the laws of nature, biological and socio-economic laws have an integral effect on its development, making a person mature. A person changes, forms and develops throughout his life. Development refers to the increase in the child's weight, the maturation of the bone and muscle system, the functioning of the genitals, the formation of intelligence. The influence of social and biological factors on the maturation of a person and his behavior is not always the same. Because his behavior, relationships, connections are also affected by age, knowledge, habits, initiative and, finally, the situation. For example: different children react differently to the same influence, which also depends on the needs of the child at the time.

Factors affecting the development of the individual. In the development of the individual, heredity, social environment, education and, finally, his own independent activity are of great importance. In whatever society a person lives, he matures based on the laws and regulations of that society. The material and spiritual development of that society has a comprehensive impact on his formation. In this country, technology, automation, telemechanics, electrification, speech, and the like affect his consciousness, mental and moral development.

The more a person knows about his environment, the more his consciousness grows. Therefore, the development of a person to maturity is closely related to the development of society. The influence of humanity on human maturity. Heredity refers to biological characteristics and similarities that are passed on to a child from parents and, in general, from close ancestors, that is, from generation to generation. According to the representatives of the premorphism movement that emerged in 16th-century philosophy, a human child acquires all the characteristics of a future

person while still in the womb, and development is the quantitative progression of these characteristics.

Literature analysis: According to the American educator and psychologist E. Thordike, all the characteristics of a person, including consciousness and mental abilities, are passed down from generation to generation, they are given by nature, like other organs. According to D. Dune, true education is not introduced from the outside, he is born with a person, education develops him. The German psychologist V. Pteren believes that a newborn child is not a person at all, he is only a mammal. At half a year old, he is equal to a monkey. At two years old, the child reaches the initial stage of humanity. (walks, talks) at 5 years old he corresponds to people of primitive society, in adolescence he reflects the medieval consciousness, and only at the age of maturity (17,18) does he become a person with a consciousness corresponding to the cultural level of the existing society. Some biogeneticists believe that from 13, 10 and even 8 years old he can become a full-fledged member of the existing society. Australian psychologist K. Buhler even attributes the moral development of a child to heredity. From the very first days of life, a child grows and matures under the influence of the environment around him.

At the same time, the child is also genetically endowed with human characteristics. (mental and physical labor, etc.) But these are inherent abilities, and for their development, the human child must live in a human environment, with people, and communicate with them. Because a person develops and matures not only as a biological being, but also as a social being. So, for the growth of the population that has passed this way to maturity, there must be mental activity, prerequisites. The role of education and upbringing in development. The influence of society on the minds of children is mainly carried out through education. The environment surrounding the child ultimately becomes a means of labor and language.

Therefore, in human development

1. It is necessary to allow education and upbringing to take the lead because in the process of education and upbringing, a person learns things that the growth of the organism and the environment cannot influence. e.g., he learns to speak, write and read from the environment through special education.

2. With the help of education and upbringing, even some of the congenital defects of a person change in the desired direction (hearing, sight and hearing). Learning to read and write has the same effect on the minds of others.

3. With the help of education, it is possible to eliminate the shortcomings that have arisen as a result of the negative influence of the environment (rudeness, swearing, playing cards, smoking, etc.)

4. In the process of education, the child not only acquires knowledge, skills and qualifications, but also a scientific worldview. He became an academician at the age of 29. Victor Goethe received a special diploma from the French Academy of Sciences at the age of 25. N.I. Lobachevsky entered Kazan University at the age of 14 and became a professor at the age of 23. The role of personal activity in human development.

In addition to the factors mentioned above, only when the person himself actively participates in social development, his innate abilities awaken, his talents and abilities grow. In this regard, his work on himself is also of great importance. A person's constant search, patiently improving his skills and qualifications, communicating with people, and other qualities are also necessary. In general, any activity that is properly organized from a pedagogical point of view affects the mental, moral, ethical, physical, and volitional development of the child. Description

of the characteristics of children's youth. According to the achievements of medicine, pediatric anatomy, physiology, psychology, and pedagogical sciences and their recommendations, the following grouping of the child's age periods has been adopted.

Main part: In addition to the school's educational activities with students, various educational and educational activities are called extracurricular activities. Extracurricular activities are a component of the school educational process and are one of the forms of organizing students' free time. Extracurricular activities have a wide range of opportunities for the comprehensive development of the individual and preparing him for life. These activities are organized on a voluntary basis in accordance with the interests of children. Students choose activities that interest them in class and extracurricular activities and participate in them independently and proactively.

Determining the organizational work, content and goals of schools and extracurricular institutions requires taking into account all aspects of our day. These extracurricular educational activities are characterized by the fact that they are aimed at determining the stages of personal development. To positively solve this problem, the system of extracurricular educational activities should include the following: - relying on the specific traditional means of forming mutual respect between teachers and students; - recognizing the growing human personality as the highest social value in education, respecting the uniqueness and individuality of each child, teenager and young man, and taking into account his social rights. Circles that fully cover extracurricular activities can be of several types:

a) science clubs;

b) skilled hands clubs;

c) carpentry clubs;

g) sports clubs;

d) amateur art clubs. In secondary schools, these activities are organized by the class teacher and the organizer of educational activities.

The class teacher closely assists the club leaders. He or she encourages his or her students who have the same interests and aspirations to become members of a club. Organized extracurricular activities complement the educational activities in the lives of students. They help them to form a correct worldview and achieve moral maturity. They create the basis for the close connection of theoretical knowledge with practice and production. The tasks of organizers who lead extracurricular activities are also multifaceted. The tasks of the organizer of extracurricular educational activities include the following:

- planning and control of extracurricular educational work;
- organizing multifaceted extracurricular work of students with the help of the pedagogical team, class activists of student organizations;
- providing methodological assistance to teachers, class leaders, parents, student organizations, class activists, directly supervising the direction of extracurricular work;
- participating in the most important educational events held at the general school and inter-school level;
- making extensive use of the power of educational and cultural institutions and the public in organizing students' free time; In this regard, three main aspects of the activity of organizers can be seen: organizational, methodological and administrative. They are often manifested in an inextricably linked manner.

The following activities can be included in the organizational activities of the organizer:

- analysis of achievements and shortcomings in the field of educational work;

- determination of the goals and objectives of educational work;
- planning of educational, mass-political work and determining their content, forms and methods;
- grouping of extracurricular educational work, identifying management personnel.

It is difficult to achieve the intended goal without clearly planning educational work in a school, without determining its content, forms and methods, without putting it into a certain system.

Conclusion: The educational impact of extracurricular activities largely depends on the level of organization of the educational process and how the student team organizes various activities. Extracurricular activities are not limited to a mandatory program, but voluntarily unite students of all ages. They carry out work on their initiative, interest them in science, and introduce them to the cultural life of the people. Extracurricular activities are the most important factor in the formation of social activity, social consciousness, and moral habits in a person. This activity includes the work of scientific teams, literary and school theaters, readers' conferences and discussions on various topics, lectures and conversations on political, moral, popular science, and labor topics, socially useful work, political information, holiday evenings and matinees, and club activities. Extracurricular activities of students, by their content, are a means of thinking and communication. Because information obtained in extracurricular activities is perceived, processed, and new knowledge is created on this basis.

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NEURO-NETWORK PEDAGOGY: CONTENT, STAGES OF DEVELOPMENT AND ANALYSIS OF INTERNATIONAL EXPERIENCE

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Abstract. *This study is devoted to a comprehensive analysis of the essence, stages of formation and development, and international experiences of the concept of neuro-network pedagogy. The research examines, from a scientific and methodological perspective, the integration of artificial intelligence and neural networks into the pedagogical process under conditions of the digital transformation of modern education systems. The emergence of neuro-network pedagogy is substantiated as the result of the convergence of social demands, technological progress, and interdisciplinary scientific research. The study provides a comparative analysis of the concepts of "digital pedagogy," "AI-based education," "neural networks in education," and "neuro-network pedagogy," clarifying their conceptual distinctions and methodological boundaries. The integration of neuro-network pedagogy with pedagogy, cognitive psychology, neurophysiology, and information technologies is revealed through its potential to organize the educational process as a learner-centered, adaptive, and data-driven system. The research scientifically substantiates the core components of neuro-network pedagogy—adaptivity, personalization, prediction, and analytical learning—and demonstrates their role in enhancing educational effectiveness. In addition, institutional and practical models of implementing neuro-network pedagogy are analyzed using the experiences of the United States, the European Union, and Asian countries as illustrative examples. In the conclusion, the prospects for adapting neuro-network pedagogy to the national education system are justified, along with the identification of existing ethical, human resource, and technical infrastructure challenges and the necessity of addressing them through a phased and systematic approach. The findings of the study contribute to substantiating neuro-network pedagogy as a promising scientific direction for the development of contemporary education.*

Keywords: *neuroset pedagogy, artificial intelligence-based education, person-centered learning, adaptive learning systems, data-driven learning.*

I. INTRODUCTION

The rapid advancement of digital technologies has profoundly transformed contemporary education systems, redefining the goals, methods, and structures of teaching and learning. The global transition toward a knowledge-based and innovation-driven economy has intensified the demand for highly adaptive, flexible, and learner-centered educational models. In this context, education is no longer perceived merely as the transmission of standardized knowledge but rather as a complex, dynamic process aimed at fostering individual cognitive development, critical thinking, and lifelong learning competencies. However, traditional pedagogical approaches, which rely heavily on uniform curricula and linear instructional strategies, increasingly struggle to accommodate learners' diverse cognitive characteristics, learning paces, and motivational profiles.

These challenges have been further amplified by the digitalization of society and the exponential growth of educational data. Learning management systems, online platforms, and digital assessment tools continuously generate large volumes of data related to learners' academic performance, behavior, engagement, and interaction patterns. While such data hold significant potential for improving educational decision-making, conventional pedagogical frameworks often lack the analytical capacity to interpret and utilize this information effectively. As a result, there is a growing need for advanced analytical tools capable of processing complex educational data and translating it into pedagogically meaningful insights.

Against this backdrop, artificial intelligence (AI) technologies—particularly neural networks and machine learning algorithms—have emerged as influential instruments in educational research and practice. AI-based systems enable the automated analysis of learning processes, identification of hidden patterns, prediction of learning outcomes, and generation of personalized feedback. These capabilities have facilitated the development of adaptive learning environments, intelligent tutoring systems, and learning analytics frameworks that aim to enhance learning efficiency and instructional precision. Nevertheless, the increasing presence of AI in education has also raised fundamental pedagogical questions regarding the role of technology, the position of the teacher, and the ethical boundaries of algorithmic decision-making.

Neural network pedagogy has evolved as an interdisciplinary scientific direction that seeks to address these questions by integrating pedagogical theory with insights from cognitive psychology, neuroscience, and information technologies. Unlike general digital pedagogy, which primarily focuses on the use of digital tools to support instruction, neural network pedagogy emphasizes the alignment of educational design with human cognitive mechanisms. It conceptualizes artificial neural networks as models inspired by human brain functioning, capable of simulating learning processes, detecting cognitive patterns, and supporting pedagogical decision-making. In this sense, neural network pedagogy does not regard technology as an end in itself but rather as a means for enhancing pedagogical reasoning and educational effectiveness.

A critical distinction of neural network pedagogy lies in its focus on personalization and adaptability. By analyzing learners' knowledge states, error patterns, and learning trajectories, neural network–based systems can support the construction of individualized educational pathways. This approach shifts the educational paradigm from standardized instruction toward learner-centered models that account for cognitive diversity and developmental dynamics. Furthermore, neural network pedagogy promotes a data-driven perspective on education, where instructional decisions are informed by empirical evidence rather than intuition alone. Such an approach has the potential to improve the objectivity and reliability of assessment, reduce subjectivity in evaluation, and strengthen formative feedback mechanisms.

Despite its growing relevance, the conceptual boundaries of neural network pedagogy remain insufficiently defined in both theoretical and practical contexts. In academic discourse, the terms "digital pedagogy," "AI-based education," "learning analytics," and "neural network pedagogy" are often used interchangeably, leading to methodological ambiguity and conceptual confusion. Moreover, while international research—particularly in the United States, the European Union, and several Asian countries—demonstrates promising outcomes of AI integration in education, the direct transfer of these experiences to different national educational systems is not straightforward. Differences in educational culture, infrastructure, teacher training, ethical standards, and regulatory frameworks necessitate a careful and contextualized analysis.

Another important issue concerns the ethical and pedagogical risks associated with the widespread use of AI technologies in education. Overreliance on automated systems may undermine teachers' professional autonomy, reduce human interaction in learning environments, and exacerbate inequalities caused by biased data or unequal access to digital resources. Consequently, neural network pedagogy must be examined not only in terms of technological efficiency but also from the perspectives of pedagogical ethics, human-centered design, and social responsibility. Ensuring transparency, explainability, and accountability in AI-supported educational systems is essential for maintaining trust and safeguarding learners' rights.

Given these considerations, there is a clear need for a comprehensive and systematic analysis of neural network pedagogy as an emerging scientific field. Such an analysis should clarify its conceptual foundations, trace its stages of development, and evaluate international experiences from pedagogical, technological, and ethical perspectives. Understanding these dimensions is particularly important for countries seeking to modernize their education systems while preserving national educational values and priorities.

The present study aims to investigate the essence of neural network pedagogy, explore its evolutionary development, and analyze foreign practices to identify key opportunities and limitations for its implementation in modern education systems. By synthesizing theoretical insights and international experiences, this research seeks to contribute to the formation of a scientifically grounded, pedagogically sound, and ethically responsible framework for the integration of neural network technologies into education.

II. REVIEW OF LITERATURE

Research conducted by Baker laid the theoretical foundations for data-driven approaches and intelligent analysis in education. The author substantiates the advantages of educational data mining methods in analyzing students' behavior, error patterns, and learning dynamics (Baker, R. S. (2014). *Educational data mining: An advance for intelligent systems in education*). This study serves as a methodological foundation for the analytical and predictive functions of neuro-network pedagogy presented in the article. Baker's approach scientifically confirms the possibility of conducting in-depth analysis of the learning process using artificial neural networks.

The Knowledge–Learning–Instruction (KLI) model developed by Koedinger and colleagues plays a significant role in explaining the cognitive mechanisms of the learning process (Koedinger, K. R., Corbett, A. T., & Perfetti, C. (2012). *The knowledge-learning-instruction framework*). This model reveals the interconnection between knowledge formation, learning processes, and instructional strategies. In the article, the cognitive foundations of neuro-network pedagogy are aligned with this approach. Identifying learners' knowledge states and constructing individualized learning trajectories through neural networks are interpreted as practical implementations of the KLI model.

In his research, Dillenbourg analyzes the evolution of digital education and emphasizes that the mere use of technology is not sufficient (Dillenbourg, P. (2016). *The evolution of research on digital education*). The author argues that pedagogical design and social interaction are decisive factors in education. This perspective fully corresponds to the idea advanced in the article—that artificial intelligence should not replace teachers but rather support the pedagogical process. Neuro-network pedagogy ensures a balance between technology and pedagogy precisely at this point.

The systematic review by Zawacki-Richter et al. (2019) is one of the most significant sources on the application of artificial intelligence in higher education (*Systematic review of AI*

applications in higher education). The authors demonstrate the impact of AI-based adaptive systems, learning analytics, and predictive mechanisms on educational effectiveness. At the same time, ethical and methodological challenges—such as algorithmic fairness, transparency, and data security—are highlighted. The article's conclusions regarding the cautious and phased implementation of neuro-network pedagogy are scientifically grounded in the findings of this research.

Luckin proposes a model of collaboration between artificial intelligence and human intelligence, interpreting AI not as an autonomous decision-maker but as a tool for enhancing human cognition (Luckin, R. (2018). *Machine learning and human intelligence*). This perspective provides the theoretical basis for the "digital collaboration model" between teachers and artificial intelligence discussed in the article. Neuro-network pedagogy, grounded in this idea, preserves the central role of the teacher. The UNESCO (2023) report *Guidance on generative AI in education and research* establishes global ethical and policy standards for the use of artificial intelligence in education. It prioritizes human rights, personal data protection, and principles of equitable education. The article's emphasis on adapting neuro-network pedagogy to national education systems is aligned with these international norms. The analyzed literature demonstrates that the concept of neuro-network pedagogy proposed in the article is developed based on existing scientific research and represents their logical continuation. The article not only synthesizes previous studies but also systematizes them from a pedagogical perspective and formulates a new scientific interpretation. It is precisely this aspect that defines the article's scientific novelty and theoretical value.

II. MATERIALS AND METHODS

This study adopts a qualitative, analytical, and comparative research design aimed at examining neural network pedagogy as an emerging interdisciplinary field in contemporary education. The methodological framework is grounded in a systematic analysis of theoretical sources, international research findings, and conceptual models related to artificial intelligence in education, neural networks, and learner-centered pedagogical approaches. Given the theoretical nature of the research, the study does not rely on experimental or empirical data collection but instead emphasizes conceptual clarification, integrative analysis, and critical interpretation of existing scholarly literature.

The research is based on a descriptive–analytical approach combined with a comparative and integrative methodology. This design enables the exploration of neural network pedagogy from multiple perspectives, including pedagogical theory, cognitive psychology, neuroscience, and information technologies. The descriptive component focuses on identifying and systematizing key concepts, definitions, and characteristics of neural network pedagogy, while the analytical component examines their pedagogical functions, developmental logic, and educational implications. The comparative approach is employed to distinguish neural network pedagogy from related concepts such as digital pedagogy, AI-based education, and learning analytics.

In addition, an integrative approach is applied to synthesize insights from different scientific domains into a coherent methodological framework. This integration is essential for capturing the interdisciplinary nature of neural network pedagogy and for avoiding a purely technological interpretation of AI applications in education. The primary data sources for this study consist of peer-reviewed journal articles, academic books, policy reports, and international analytical reviews published in reputable scientific databases. Particular attention is given to sources addressing artificial intelligence in education, neural networks, intelligent tutoring

systems, learning analytics, and human-centered AI. International experiences from the United States, the European Union, and selected Asian countries are included to ensure geographical and methodological diversity.

The selection of sources is guided by the following criteria:

(1) relevance to neural network pedagogy or closely related fields;

(2) scientific credibility and publication in recognized academic outlets;

(3) contribution to theoretical, methodological, or ethical discussions; and

(4) applicability to modern education systems.

This systematic selection process ensures the reliability and validity of the analytical foundation of the study. Several complementary methods of qualitative analysis are employed in this research. First, conceptual analysis is used to examine the definitions, theoretical assumptions, and core components of neural network pedagogy. This method allows for the clarification of conceptual boundaries and the identification of key pedagogical principles such as adaptability, personalization, data-driven decision-making, and predictive analysis.

Second, content analysis is applied to selected scholarly sources to identify recurring themes, methodological patterns, and dominant research directions. Through thematic coding and categorization, the study reveals how neural network technologies are positioned within educational discourse and how pedagogical roles and learning processes are interpreted.

Third, comparative analysis is conducted to examine differences and similarities between international approaches to AI integration in education. This method highlights variations in institutional frameworks, ethical standards, teacher involvement, and technological implementation strategies. Such comparisons provide a basis for evaluating the transferability of foreign experiences to different national educational contexts.

The analytical framework of the study is structured around four core dimensions: pedagogical, technological, cognitive, and ethical. The pedagogical dimension focuses on instructional design, learner-centered approaches, and the evolving role of the teacher. The technological dimension examines neural networks, machine learning algorithms, and data analytics as tools supporting educational processes. The cognitive dimension draws on insights from cognitive psychology and neuroscience to explain learning mechanisms and individual differences. Finally, the ethical dimension addresses issues of transparency, data privacy, algorithmic bias, and professional responsibility.

By analyzing neural network pedagogy across these dimensions, the study ensures a balanced and holistic methodological perspective that transcends narrow technological determinism. The study acknowledges certain methodological limitations. As a theoretical and literature-based investigation, it does not include empirical validation through experiments or field studies. Consequently, the findings reflect conceptual interpretations rather than measurable learning outcomes. However, this limitation is offset by the depth of theoretical analysis and the breadth of international perspectives considered. The results of this study may serve as a methodological foundation for future empirical research and applied studies.

Ethical considerations are integrated into the methodological framework as a guiding principle rather than a separate procedural requirement. The study critically examines ethical challenges associated with AI-driven educational systems, emphasizing the importance of human-centered design, teacher autonomy, and learner protection. By incorporating ethical analysis into each stage of the methodological process, the research aims to promote responsible and sustainable applications of neural network technologies in education.

III. RESULTS

The results of the present study provide a comprehensive understanding of neural network pedagogy as an emerging scientific and pedagogical direction within modern education systems. Through systematic analysis of theoretical sources and international research practices, several significant findings were identified that clarify the conceptual status, functional components, and practical potential of neural network pedagogy.

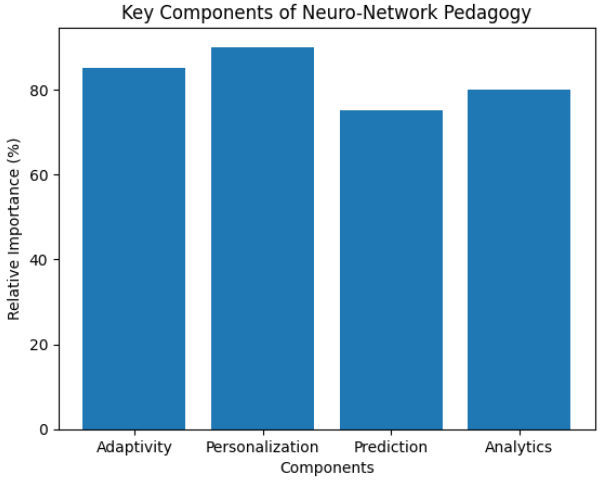
First, the findings demonstrate that neural network pedagogy is evolving as an independent interdisciplinary field rather than a derivative component of digital or AI-based education. The analysis revealed that, unlike traditional digital pedagogy—which primarily focuses on the use of technological tools—neural network pedagogy is grounded in a deep integration of pedagogical theory, cognitive psychology, neuroscience, and artificial intelligence. This integration enables a more accurate modeling of learning processes and supports pedagogical decision-making based on cognitive and behavioral data. As a result, neural network pedagogy can be conceptualized as a scientifically substantiated framework that extends beyond instrumental technology use.

Second, the core structural components of neural network pedagogy were systematically identified and classified. The results indicate that adaptability, learner-centeredness, predictive analysis, and data-driven instructional design constitute the foundational elements of this approach. These components collectively enable real-time monitoring of learners' progress, identification of learning difficulties, and dynamic adjustment of instructional strategies. The study shows that such functionality significantly enhances the responsiveness of the educational process to individual learners' needs and cognitive characteristics.

Table 1: Core Components of Neuro-Network Pedagogy and Their Pedagogical Functions

Component	Content
Adaptivity	Adapting the learning process to the student's knowledge level, errors, and learning pace in real time
Personalization	Formation of individual learning trajectories based on cognitive and psychological characteristics
Prediction	Predicting learning outcomes, risk zones, and learning dynamics
Analytical learning	Making pedagogical decisions based on learning analytics and data-driven analysis

Figure 1. Relative Importance of the Core Components of Neuro-Network Pedagogy



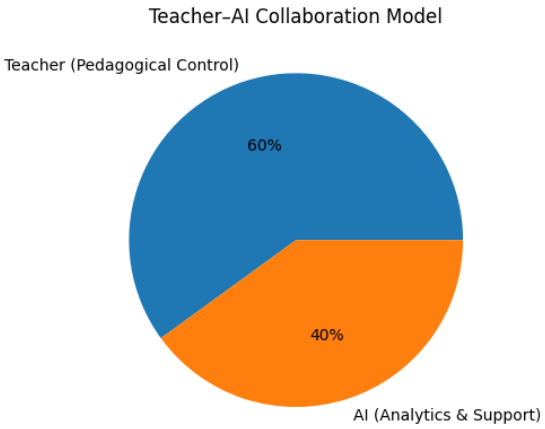
Third, the analysis confirms the high analytical capacity of neural networks in modeling learning behaviors and cognitive patterns. The reviewed studies demonstrate that neural network–

based systems are capable of detecting latent relationships between learning activities, performance indicators, and error patterns that are often inaccessible through traditional pedagogical assessment methods. This finding highlights the potential of neural networks to improve diagnostic accuracy and to support early intervention strategies aimed at preventing academic failure.

Fourth, the results emphasize the transformation of the teacher's role within neural network–supported educational environments. Rather than replacing the teacher, artificial intelligence functions as an analytical assistant that provides evidence-based recommendations and predictive insights. The study indicates that effective implementation of neural network pedagogy strengthens the teacher's capacity for informed pedagogical decision-making while preserving professional autonomy and human-centered instruction. This collaborative human–AI model emerges as a key condition for sustainable integration of intelligent technologies in education.

Fifth, the comparative analysis of international experiences revealed distinct regional approaches to the implementation of neural network pedagogy. In the United States, the emphasis is placed on learning analytics, adaptive platforms, and measurable learning outcomes. European Union practices prioritize ethical regulation, transparency, and data protection within AI-driven educational systems. In contrast, several Asian countries demonstrate large-scale, state-supported deployment of intelligent educational technologies, often integrated into national digital education strategies. These findings underscore the importance of contextual adaptation when transferring neural network pedagogy into different educational systems.

Figure 2. Teacher–Artificial Intelligence Collaboration Model in Neuro-Network Pedagogy



Sixth, the results highlight a number of systemic challenges associated with the application of neural network pedagogy. These include insufficient methodological preparedness of teachers, limited interpretability of algorithmic outputs, ethical risks related to data privacy and bias, and infrastructural disparities between educational institutions. The study shows that ignoring these challenges may reduce pedagogical effectiveness and undermine trust in AI-supported educational innovations.

Overall, the results confirm that neural network pedagogy possesses substantial potential to enhance educational quality, personalization, and efficiency when implemented within a well-defined pedagogical and ethical framework. At the same time, the findings indicate that its successful adoption requires a balanced approach that integrates technological innovation with pedagogical expertise, ethical responsibility, and contextual sensitivity.

IV. RESULTS AND DISCUSSION

The findings of this study provide important insights into the conceptual and practical significance of neural network pedagogy within modern education systems. By synthesizing theoretical perspectives and international research practices, the discussion contextualizes the results in relation to existing literature and highlights their pedagogical, methodological, and ethical implications.

First, the identification of neural network pedagogy as an independent interdisciplinary field aligns with and extends prior research on artificial intelligence in education. While earlier studies primarily conceptualized AI as a supportive technological tool, the present findings emphasize its pedagogical integration with cognitive and learning theories. This perspective supports the arguments of scholars who advocate for a shift from technology-centered innovation toward pedagogy-driven AI implementation. The results demonstrate that neural network pedagogy transcends the instrumental use of digital tools by embedding AI within the logic of instructional design and learner cognition.

Second, the core components identified in this study—adaptability, learner-centeredness, predictive analytics, and data-driven decision-making—correspond with contemporary educational paradigms emphasizing personalization and flexibility. Previous research on adaptive learning systems and intelligent tutoring environments has highlighted similar benefits; however, the present analysis contributes by framing these elements within a coherent pedagogical model. This theoretical consolidation strengthens the conceptual clarity of neural network pedagogy and provides a structured foundation for future empirical investigations.

The findings related to neural networks' capacity to model learning behaviors and detect latent cognitive patterns resonate with existing studies in learning analytics and educational data mining. However, the discussion extends these findings by emphasizing their pedagogical interpretation rather than purely technical performance. The ability of neural networks to generate predictive insights is meaningful only when such insights are translated into pedagogically appropriate interventions. This reinforces the necessity of maintaining the teacher's central role in interpreting algorithmic outputs and contextualizing them within the learning environment.

A particularly significant discussion point concerns the evolving role of the teacher in AI-supported education. The results challenge the misconception that artificial intelligence may replace human educators. Instead, they support a collaborative human–AI model in which teachers retain decision-making authority while benefiting from enhanced analytical support. This finding aligns with human-centered AI frameworks and underscores the importance of teacher training and methodological readiness as prerequisites for effective implementation.

The comparative analysis of international experiences further enriches the discussion by demonstrating that neural network pedagogy is not a universally uniform phenomenon. Differences in regulatory frameworks, ethical standards, and institutional capacities shape how AI technologies are integrated into education systems. These variations highlight the limitations of direct policy transfer and emphasize the need for contextual adaptation, particularly for countries seeking to modernize education while preserving cultural and pedagogical values.

Ethical considerations emerge as a central theme in the discussion. The results underscore persistent concerns related to data privacy, algorithmic bias, transparency, and accountability. While technological advancements offer unprecedented analytical capabilities, they also introduce risks that may undermine equity and trust if left unaddressed. The discussion therefore reinforces

the argument that ethical governance must be embedded within the methodological and institutional design of neural network pedagogy.

Finally, the discussion acknowledges the limitations of the present study, particularly its theoretical and literature-based nature. Although the findings provide a robust conceptual framework, empirical validation through experimental or longitudinal studies is necessary to assess real-world effectiveness. Future research should focus on developing measurable indicators of pedagogical impact, exploring teacher–AI interaction models, and evaluating long-term learning outcomes in diverse educational contexts.

In conclusion, the discussion affirms that neural network pedagogy represents a promising yet complex direction in educational innovation. Its successful implementation depends on balancing technological potential with pedagogical expertise, ethical responsibility, and contextual sensitivity. By situating the findings within existing scholarly discourse, this study contributes to a more nuanced understanding of how neural network technologies can support meaningful and sustainable educational transformation.

V. CONCLUSION

This study has demonstrated that neuro-network pedagogy represents a coherent and evolving scientific field emerging from the integration of pedagogy, cognitive psychology, neuroscience, and artificial intelligence technologies. The analysis confirms that neuro-network pedagogy is not merely a technological innovation but a conceptually grounded pedagogical paradigm aimed at enhancing educational quality through data-driven, adaptive, and human-centred approaches.

The findings show that the core value of neuro-network pedagogy lies in its ability to support personalized learning, adaptive instructional design, predictive analytics, and analytical decision-making in education. By leveraging artificial neural networks, it becomes possible to model learners' cognitive characteristics, learning dynamics, and knowledge states, thereby enabling the construction of individualized learning trajectories. This approach significantly strengthens the scientific basis of pedagogical decision-making and contributes to the sustainability and effectiveness of learning outcomes.

At the didactic level, neuro-network pedagogy expands the possibilities for developing students' knowledge, skills, and competencies in an integrated manner. Continuous formative assessment, adaptive feedback, and real-time learning analytics allow educators to move beyond static evaluation models toward flexible and developmental assessment systems. As a result, learning becomes more responsive to individual needs while maintaining coherence with institutional and curricular objectives.

The research further confirms that the role of artificial intelligence in education should be understood within a collaborative framework rather than as a replacement for the teacher. The teacher–AI partnership model positions artificial intelligence as an analytical and supportive tool that enhances pedagogical reflection, instructional planning, and monitoring processes, while preserving the teacher's central role in ethical judgment, educational guidance, and human interaction. This balance is essential for maintaining pedagogical integrity and safeguarding the humanistic foundations of education.

At the same time, the study identifies significant limitations and challenges associated with the implementation of neuro-network pedagogy. These include issues related to data quality and representativeness, technological and infrastructural disparities, insufficient teacher preparedness, and ethical risks such as algorithmic bias, transparency, and data privacy. The presence of these

challenges underscores the necessity of a cautious, phased, and context-sensitive approach to implementation. The analysis of international experience indicates that while technological foundations of neuro-network pedagogy are globally similar—adaptive platforms, learning analytics, and personalized feedback—the institutional and policy frameworks differ substantially. The United States emphasizes data-driven efficiency and empirical validation, the European Union prioritizes trustworthy and ethical AI, and Asian countries focus on large-scale implementation aligned with national education policies. These differences highlight the importance of adapting neuro-network pedagogy to national educational, cultural, and regulatory contexts rather than adopting foreign models without modification. In the context of Uzbekistan's education system, the integration of neuro-network pedagogy presents significant strategic potential. Ongoing digital transformation, the shift toward competency-based and learner-centred education, and increasing digital literacy among students create favourable conditions for gradual implementation. However, successful adaptation requires the development of clear ethical and legal frameworks, modernization of teacher training systems, strengthening of interdisciplinary competencies, and continuous investment in technological infrastructure.

In conclusion, neuro-network pedagogy possesses strong scientific, didactic, and strategic potential to contribute to the modernization of contemporary education systems. Its effective implementation depends on maintaining a balance between technological innovation and pedagogical responsibility, ensuring human-centred design, and aligning global advances with national educational priorities. When approached systematically and responsibly, neuro-network pedagogy can become a key mechanism for improving educational quality, supporting personalized learning, and advancing data-informed educational governance.

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UZBEK DIDACTIC GAMES IN LANGUAGE LESSONS

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Abstract. *It is necessary to widely use didactic games in the educational process today, because it gives the student the opportunity to learn the world in other ways than in the usual way of teaching. The article presents new methods of teaching O‘zbek.*
Keywords: *“Chain Of Words”, “Fifteen Questions Per Letter”, “Word Within A Word”, “Top Down And Vice Versa”, “Hidden Letter”, “Miracle Boxes”.*

INTRODUCTION

Bringing non-traditional methods to o‗zbek language classes and integrating them into the educational content, finding new ways of teaching, creates the basis for meeting the requirements of the State Education Standards. The role of native language and literature classes is incomparable in the development of the human personality in all aspects, in awakening a sense of respect for universal and national values in the growing young generation, in developing a sense of pride in the national language and the traditions of their people. Therefore, it is necessary for teachers of mother tongue and literature to organize their lessons with these goals in mind.

At the moment, during the lesson, “Pantonym phrase”, “Ingenuity”, “Fish swims”, “Lily flower”, “Travel game”, “Sequence”, “Prove your opinion!”, “Find a pair!”, “Hurry up” Innovative games such as “game”, “Court lesson”, “Buds string” create a number of conveniences in achieving the intended goal. Among them, especially in any type of lesson - whether it is the formation of new concepts, knowledge, skills and competencies, whether it is reinforcing and testing or mixed type - the use of a didactic game gives the expected effect. Because the educational process is a living, living organism that always needs improvement and renewal. Therefore, today teachers are required to research new methods of education as much as possible. In today's age of advanced information technologies, students don't like the same lessons, they get bored. As a result, students cannot master the lesson well.

In this article, we aim to clarify the ways of using game methods in the process of growing and developing the students' oral and written speech in o‘zbek language teaching, and to give a guide to the science teacher on organizing and conducting games. According to the psychological and philosophical dictionaries, the game is a form of activity aimed at the application and acquisition of social experience in the fields of science and culture related to the individual in conditional situations of the movement of individuals and object susing socially reinforced methods. At the same time, each game is played according to certain rules. It is important to pay attention to the fact that following the rules of the game is like “the decision is firm, there is no room for appeal”. This is what makes every participant want to win the game.

Today, it is necessary to widely use the game method in the educational process, because it gives the student the opportunity to learn the world in other ways than in the usual form of teaching: in this process, imagination and independent research in finding the answer, as well as a new look at already known facts and events, supplementing and expanding knowledge are allowed, allows to connect with other separate events, to produce results and to distinguish between them.

The game encourages the student to compare himself with other students and evaluate them accordingly. Learning to judge yourself is a necessary skill that will help you throughout your life. Not being able to correctly assess one's capabilities prevents the development of the qualities of determination, stability and strength in a person's character. Usually, in the game, not the child who knows a lot, but the children who have developed thinking skills, who can observe the progress of the game and can assess the situation correctly, accurately and quickly, that is, not only those who have a good “memory store”, but from the riches in this “memory store” will winthose who use it wisely will be lucky.

The game requires the cooperation of the whole team. It creates an atmosphere of healthy competition that develops students' creative abilities. In the hands of a good organizer, the game becomes a weapon that requires a lot of mental pressure from the players, and at the same time gives them pleasure. We found it necessary to describe the procedure of some of the philological games that enrich the educational process in the mother tongue classes and increase the effectiveness of the practical application of the acquired theoretical knowledge, using the example of nouns.

“CHAIN OF WORDS” Pupils are asked to make a chain of words related to nouns. In this case, the next word must start with the last letter of the previous word. For example:

Cheese-eagle-earth-theatre-e-book-kangaroo-observation...

This competition is based on speed, and the student who makes the most word chains in a certain time is the winner.

The game condition can be complicated by creating a chain of only one-syllable words:

Nag-gad-dad-dab-back-keg...

“FIFTEEN QUESTIONS FOR ONE LETTER”

The teacher writes fifteen questions on the board based on the table below (if the question is written on a piece of paper, it can be used several times). Then the teacher says a letter, the students write in their notebooks the words that start with that letter followed by the corresponding number. For example, let's take the letter “m”, the answers can be:

Number	Question	Answer
1	Writer	Marie de France
2	Artist	Mary Me Crossan
3	Composer	Madin, Henri
4	A work of art	The Magician: A novel by Colm Toibin
5	Feature film	My dog skip (comedy drama film)
6	Cartoon	Mulan, Mickey Mouse
7	Object	Mirror
8	Animal	Mouse
9	Bird	Mountain Seril
10	Flower	Moonflower vine
11	Plant	Magnolia

12	City	Miami
13	Country	Madagascar
14	Name	Michael
15	Proverb	Man proposes, God disposes

In this game, the student who writes the answers quickly and correctly first wins. Depending on the level of preparation of students, the nature and number of questions can be changed. It is advisable to use letters whose answers are easy to find in the game - a, b, g, 1, s and other letters.

“A WORD WITHIN A WORD”

Students are given a six-seven-letter word (at least three of which must be vowels). Students must use these letters to make new words within a certain time period (3-5 minutes). Whoever makes the newest words in the time limit wins. For example, the following words can be made from the word "elegance": Charm, delicacy, dignity, gentility, grace, grandeur, luxury, magnificence. The teacher says: “Time is up!” after the sentence, the students stop writing and one of them reads aloud what he wrote, while the others compare what they wrote with what he said. If they meet the same words, they draw a line over it. The winner is the one with the most un-underlined words.

“TOP TO BOTTOM AND VICE VERSA”

The teacher instructs the students to write a word consisting of 4 or 5 letters in columns. Depending on the number of letters in the selected word, a table of 4x4 or 5x5 cells is drawn from the column. The last cell of the table is instructed to write the word from the first column from bottom to top. Under the guidance of the teacher, students fill in the blank boxes in the middle of the table with the corresponding letters and form new words. For example, the following words are formed from the word “falcon”:

Top to bottom	**Vice versa**
F	T
R	I
U	U
I	R
T	F

F	A	B	L	E
R	A	D	I	0
U	N	F	I	T
I	D	I	0	M
T	A	B	L	E

The student who fills the boxes first is the winner. Do not forget that not all words are suitable for this game. For this reason, the teacher is required to preview the words to be used in the game.

“THE HIDDEN LETTER”

In this game, students are asked to replace the dots with letters representing vowel sounds to form a new word:

...ea... - deaf, dead, cease, peace

The condition of the game can be slightly changed and made more complicated: instead of dots, make new words by using letters representing consonants:

....ck.... -aback, o'clock, lack, tack

In this game, the student who writes the most words in the specified time period wins.

CONCLUSION

The conducted theoretical analysis and methodological examination confirm that the integration of didactic games into language education is not merely an auxiliary activity, but a pedagogically substantiated technology grounded in constructivist learning theory, activity-based teaching, and communicative competence development frameworks. Didactic games enhance cognitive engagement through problemsolving, associative thinking, language manipulation and semantic processing, thereby activating higher-order thinking skills defined in Bloom's taxonomy. The structured application of game elements, such as rule-based interaction, competitive motivation, and time-bounded tasks, creates a learning environment where students demonstrate not only linguistic knowledge but also metacognitive awareness, self-regulation and socio-emotional collaboration.

The analysis of game samples such as "Chain of Words", "Fifteen Questions for One Letter", "A Word Within a Word", "Top to Bottom and Vice Versa", and "Hidden Letter" demonstrates their methodological capacity to enlarge lexical repertoire, increase phonological awareness, reinforce orthographic patterns, and stimulate morphological sensitivity. Their effectiveness is reflected in students' ability to generate words autonomously, negotiate meaning creatively, and apply previously acquired knowledge in novel contexts. This aligns with contemporary educational principles that view the learner as an active constructor of meaning rather than a passive recipient of information.

Furthermore, the implementation of game-based strategies in Uzbek language classes positively influences motivation, reduces affective barriers, fosters intrinsic interest, and transforms the classroom climate into a dynamic interactive space. Game mechanics ensure sustained attention, voluntary participation and formative assessment embedded within the activity itself. Consequently, didactic games serve as a medium for bridging theoretical linguistic content with practical speech performance — oral and written — thus increasing learning retention and communicative fluency.

In conclusion, incorporating didactic games into language pedagogy should be regarded as a systematic methodological approach rather than occasional reinforcement. Their integration into curricula contributes to competency-based education, supports individualized learning trajectories, and corresponds to modern state standards focused on creativity, critical thinking and independent reasoning. Therefore, it is recommended that teachers expand the repertoire of linguistic games, adapt them to age and proficiency levels, and apply them regularly as a core tool to enhance educational outcomes in the Uzbek language learning process.

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TRENDS IN DEVELOPING PROJECT-BASED THINKING IN ARCHITECTURAL EDUCATION

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Abstract. *Project-based learning and design studios have long been the cornerstone of architectural education. In recent years, global forces such as digital transformation, sustainability challenges, and social equity have driven schools of architecture to innovate their pedagogy. This article examines current trends in cultivating project-based thinking in architecture curricula worldwide. Using a comprehensive literature review (2018–2025) and analyses of global surveys (e.g. UIA 2025), we identify key developments: the integration of advanced technologies (VR/AR, parametric design, BIM) into studio learning; the shift toward collaborative, interdisciplinary "live" projects involving community engagement; adoption of design thinking methodologies to frame open-ended design problems; and the emergence of flexible or hybrid studio formats accelerated by the COVID-19 pandemic. While traditional studio pedagogy remains dominant, empirical findings suggest that project-based, constructivist approaches enhance students' creative problem-solving, teamwork, and critical-thinking skills. We discuss implications for curriculum design and faculty development, arguing for curricula that expand live project experiences, foster civic and environmental responsibility, and leverage digital tools to prepare architects for 21st-century challenges.*

Keywords*: architectural education; project-based learning; design thinking; pedagogical innovation; technology integration.*

Introduction

The hallmark of architectural education has traditionally been the design studio, a signature pedagogy where students work on semester-length projects under faculty mentorship[1]. In this setting, project-based thinking is intrinsic: students tackle complex, open-ended design problems through rapid prototyping and critique [1]. However, recent decades have seen profound changes in society and technology that challenge the conventional model. Global factors – including digital transformation, sustainability imperatives, social equity, and decolonization movements – are reshaping the architect's role and, by extension, how architects should be educated [2][3]. A 2025 survey by the International Union of Architects (UIA) notes that schools must respond to climate breakdown, urbanization, and digitalization by expanding interdisciplinary skills; architects are increasingly viewed as civic leaders and collaborators rather than lone designers [2]. In this context, *project-based thinking* – the habit of approaching problems through integrative, design-oriented projects – is gaining renewed emphasis.

Theoretical frameworks for this trend include constructivist and experiential learning theories, which posit that learners build understanding through active engagement with real-world tasks [12][3]. For example, *design thinking* pedagogy in architecture encourages framing ill-defined problems to stimulate creativity. As one study found, design problems "should not be completely specified by the instructor" so that students themselves participate in defining the

solution space[9]. Signature pedagogies literature also argues that studio education remains a fertile ground for applying project-based methods [1]. These ideas reflect calls to modernize curricula with collaborative, practice-led approaches. This paper explores current *international trends* in cultivating project-based thinking within architectural education. By conducting a qualitative review of recent scholarly literature (2018–2025) and analyzing data from global surveys and conferences, we identify major developments in pedagogy and technology. The article is structured with an introduction to the problem, a description of methods, a presentation of findings on emerging trends, and a discussion of their pedagogical implications.

Methods

This study employed a qualitative literature synthesis approach, examining publications from 2018 through 2025 on architecture education, studio pedagogy, and project-based learning. Sources included peer-reviewed journal articles, conference proceedings, and reports indexed in Scopus/WoS where available. Key search terms were “architectural education,” “project-based learning,” “design thinking,” and “studio pedagogy.” We also incorporated recent surveys (e.g. UIA global survey 2025[2]) and analyses of educational innovations. In total, dozens of international sources were reviewed.

To structure the analysis, findings were categorized into thematic trends. This approach is similar to systematic reviews of architectural pedagogy, which use frameworks to extract instructional patterns [14]. For example, Kharvari and Kaiser (2022) describe using a modified PICO strategy to assess educational interventions in design[14]. Our review sought to identify recurring innovations (e.g. technology use, collaborative models, assessment changes) and to link them to underlying educational theories (constructivism, experiential learning, etc.). The resulting synthesis reflects both theoretical discussions and empirical case studies in architecture education.

Results

Technological Integration and Digital Design. One clear trend is the integration of emerging digital technologies into studio teaching. Researchers report that virtual and augmented reality (VR/AR) are being used to enhance spatial understanding. For example, Hou et al. (2023) found that immersive VR training improved students’ scale perception nearly as effectively as real-world experience [15]. A systematic review likewise concludes that XR technologies (VR, AR, MR) *“are capable of enhancing various stages of the design process”* and improving learning outcomes for architecture students [6]. Foziljonova (2025) emphasizes that architecture curricula must incorporate VR/AR, parametric modeling, and simulation to foster innovative thinking [5].

Similarly, educational experiments have introduced Building Information Modeling (BIM), digital fabrication (3D printing, CNC), and computational design tools into projects. Simon and Hu (2018) note a wave of pedagogical innovations at their school: technology-driven design thinking exercises, game-based learning, flipped studios, and project-based activities all emerged alongside new tools like 3D fabrication and parametric software [8]. These approaches expose students to industry-standard workflows and encourage experimentation.

The COVID-19 pandemic accelerated some digital adoption: many programs used online platforms and hybrid studios [10]. Although few schools fully replaced the studio model, even limited online collaboration revealed benefits such as flexible learning and the ability to work across distances [11]. However, as one survey cautions, only about 11% of programs had adopted fully hybrid or virtual studios by 2025 [16], and most reverted to face-to-face design work afterwards. Overall, the trend points to *augmenting* traditional studio work with VR/AR visualization, BIM and parametric design projects, and digital fabrication labs (makerspaces).

Collaborative and Project-Based Studio Practices. Architectural education inherently involves project-based work, but recent innovations emphasize deeper collaboration and interdisciplinarity. The studio remains organized around semester-long projects [1], but curricula are increasingly structured to require teamwork, client engagement, and real-world constraints. Latto (2024) observes that project-based learning in architecture encourages team-based design activities, peer discussion, and iterative critique [12]. These social-constructivist approaches echo Vygotsky's model of learning through collaboration.

There is a movement to break from the "lone genius" model. For instance, despite the collaborative nature of design, a 2025 UIA survey found that 76% of programs still assess students via individual portfolios rather than group projects [4]. This highlights a gap: while studio assignments may involve shared work, formal assessment lags. Educators argue for rebalancing to reward group projects that simulate professional teamwork. Panayi and Charalambous (2022) demonstrate how *co-creation studios* — projects developed jointly with community stakeholders — give students experience in the social aspects of design, such as sustainability and inclusivity [7].

Another development is interdisciplinary project-based programs. Some schools pair architecture students with engineers, planners, or social scientists on capstone projects addressing complex urban problems [7][3]. These collaborations broaden the design brief and require integrated thinking, a hallmark of real architectural practice. Salama and Patil (2025) describe a "socius-centric" pedagogy: studios that explicitly include Community Design, Design–Build, and Live Project models so that social and cultural dimensions are woven into learning[3]. In these models, students work on actual briefs (e.g. designing a community center or restoring a heritage site) rather than hypothetical assignments. Such live projects have been shown to deepen student motivation and civic responsibility.

Empirical case studies report that embedding authentic projects significantly boosts student engagement and outcomes. For example, Elaby et al. (2022) evaluated a design-build studio and found it markedly improved first-year students' problem-solving confidence and skills [17]. Similarly, research suggests that students in PBL settings develop greater self-directed learning habits and creativity than in conventional studios (as noted by Kolmos et al., 2004 [18] and others). In sum, trends point to designing studio curricula as collaborative research projects, aligning with signature pedagogies of other professions (engineering, software) but rooted in architectural tradition [1].

Design Thinking and Problem Framing. Design thinking, a term popularized in business schools, has permeated architecture education as well. In practice, this means explicitly teaching stages like empathizing with user needs, iterative prototyping, and reframing problems. Ghonim (2017) found that educators increasingly prefer presenting students with ambiguous, open-ended problems, reserving judgement and allowing learners to define part of the brief themselves [9]. The goal is to mimic realistic complexity and encourage creativity rather than simple problem-solving.

In support of this, recent reviews of design pedagogy note that project-based courses are focusing more on ideation and reflection cycles. For instance, a 2025 literature review observes that PBL curricula emphasize *"the role of creativity, iterative design thinking, and structured evaluation"* [19]. Activities like design charrettes, co-design workshops, and concept mapping are being integrated into studio culture to complement the traditional form-making process. Design thinking trends also intersect with sustainability education: many programs now frame projects

around social and environmental challenges (for example, designing for accessibility or community resilience). Salama and Patil (2025) explicitly connect this to studio practice: only by embedding social dimensions ("the socius") in every project can students become critically reflexive about spatial justice [3]. This reflects a broader shift from architecture as purely artistic or technical toward architecture as a problem-solving discipline addressing human needs.

Hybrid Learning Models and Post-Pandemic Adaptations. The COVID-19 pandemic forced architectural educators to experiment with remote and hybrid studio formats. According to Saleh et al. (2022), the "new normal" of online and blended learning challenged the physical studio but also revealed new possibilities [10]. When studios moved online, students experienced drawbacks (isolation, loss of informal critique) but also benefits: flexible schedules, more focused work environments, and reduced logistical overhead [11]. Many students gained technical literacy from using digital collaboration tools, and some projects went paperless (a positive environmental impact).

Going forward, these experiences have legitimized *hybrid studio* models, where virtual and physical elements are combined. Saleh et al. note that schools are now exploring networked, delocalized learning environments with stronger links to professional practice [10]. For example, studios may include virtual reality sessions with remote instructors, cloud-based BIM collaboration, and online juries connecting multiple campuses. While the essence of studio work remains in-person, project-based thinking is extending beyond the drafting table. Institutional changes are also under consideration. Educators now recognize the need for faculty development in digital pedagogy [20], and some schools are redesigning assessment to suit blended formats. For instance, timed "virtual pin-ups" and electronic portfolios have been adopted. These shifts represent a trend toward more flexible, student-centered learning environments that still center on real design projects, even when students are not all together in one room.

Discussion

The trends identified above reveal a convergence of traditional studio pedagogy with 21st-century innovations. The project-based core of architecture education remains intact [1], but its implementation is broadening. Technology is no longer ancillary; it is becoming integral to how projects are conceived and evaluated [5][15]. Our review shows that extended reality and parametric tools are not pedagogical add-ons but catalysts that enable new kinds of projects (e.g. interactive installations, sustainable simulations). When harnessed properly, digital media can make design thinking more explicit and accessible to novice students [6][5].

Collaboration and social engagement are similarly redefining project-based thinking. The evidence from Salama & Patil (2025) and Panayi & Charalambous (2022) indicates that when studios partner with communities, students develop a more nuanced understanding of context and client needs[3][7]. This aligns with constructivist theory: learning occurs through authentic social practice. By involving external stakeholders, programs are blurring the line between education and practice, giving students agency and feedback loops that mirror professional work [7][17]. The pedagogical implications are significant. Educators should consider expanding *live-project* components, such as design-build studios or community-engaged seminars. Incorporating design thinking exercises can help students frame problems holistically, preparing them for complex, interdisciplinary challenges. Assessment methods must evolve too: moving beyond individual grading to include peer review and client feedback will better cultivate the collaborative skills architecture increasingly demands [4][12].

However, implementation challenges remain. The UIA survey highlights resource and faculty development constraints: many schools cite insufficient funding and lack of trained staff as barriers[16]. There is also uneven adoption globally; for example, only 18% of schools in Africa reported high integration of interdisciplinary projects in 2025 [16], suggesting regional disparities. Further research should examine these inequities and identify scalable strategies. Theoretically, our findings reinforce learning science in design. Project-based studios embody Kolb's experiential cycle and Papert's constructivism, emphasizing learning-by-doing [12]. Our review suggests that well-designed PBL environments enhance critical thinking and self-efficacy [12][17]. As Laurillard (2012) argues, teaching can be viewed as a design problem in itself; these pedagogical innovations can be thought of as designing the *learning environment* with iterative feedback [21][3].

Implications for Practice

For practitioners (educators and administrators), the implications include:

- Curriculum redesign: Integrate long-term, real-world projects across studio courses; embed technology lab work into core classes; ensure sustainability and social topics are part of design briefs.

- Faculty development: Train instructors in new media (VR/AR), collaborative pedagogy, and online facilitation. UIA (2025) notes that targeted faculty development is needed to support these trends[16].

- Infrastructure investment: Build makerspaces (e.g. FAB labs) and digital studios as platforms for project-based work (as exemplified by new FAB labs in Central Asia universities).

- Assessment reform: Include group grading, process-based evaluation, and live-client feedback in rubrics.

- Global collaboration: Leverage networks so students can work on projects spanning different cultures and scales, preparing them for a global profession.

These changes align with calls from employers and accreditation bodies for graduates who can work in teams, use advanced tools, and tackle societal challenges. Our analysis provides a knowledge base for policy: schools should benchmark their practices against these emerging trends and share best practices internationally.

Conclusion

Project-based thinking remains at the heart of architecture education, but its forms are evolving. This study has traced how recent innovations – from VR-enabled studios to community-driven design-build – are shaping the next generation of architectural pedagogy. The literature shows that when implemented thoughtfully, these trends enrich learning by making studios more collaborative, technological, and socially relevant [3][6]. To fully realize these benefits, educators must be intentional in curriculum design: fostering an environment where students undertake meaningful projects, reflect on impact, and iterate on solutions. As architecture schools worldwide adapt to new realities, project-based thinking will continue to develop, bridging the gap between education and the complex demands of practice. Further empirical research should measure the outcomes of these pedagogical shifts, ensuring that future architects are equipped with both creative vision and practical skills to address global challenges.

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THEORETICAL FOUNDATIONS OF STEAM EDUCATION AND ITS INTEGRATION INTO COMPUTER SCIENCE TEACHING

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Abstract. *This paper examines the theoretical foundations of STEAM (Science, Technology, Engineering, Art, Mathematics) education and its integration into computer science teaching in private schools and learning centers. The study highlights the necessity of fostering creativity, analytical skills, and practical competencies among students in the context of a digital society. Interdisciplinary integration, project-based activities, and the use of digital learning tools are analyzed for their pedagogical effectiveness. The findings demonstrate that STEAM-based methodologies significantly enhance learning motivation, knowledge acquisition, practical skills, and prepare students to meet the demands of the modern knowledge-based economy.*

Keywords: *STEAM education, computer science pedagogy, project-based learning, hands-on learning, creativity, digital competence, interdisciplinary integration, private education institutions.*

Introduction. The rapid development of digital technologies has transformed contemporary society, requiring new educational approaches that go beyond traditional knowledge transfer. In particular, computer science education must be updated to integrate real-world applications, fostering not only theoretical understanding but also practical, creative, and problem-solving competencies. STEAM education has emerged as a leading pedagogical framework that supports such interdisciplinary and experiential learning. Private schools and learning centers are uniquely positioned to implement STEAM approaches due to their flexible learning environments, modern technical infrastructure, and innovative management practices, thereby enhancing the quality and relevance of computer science instruction.

STEAM pedagogy is grounded in constructivist principles, emphasizing active student engagement in knowledge creation rather than passive reception. In computer science, this approach facilitates the integration of algorithmic thinking, programming, modeling, data analysis, and digital project creation with natural sciences, engineering, mathematics, and design, allowing students to develop problem-solving skills and creative decision-making abilities. In the context of a rapidly digitalizing society, computer science has become an essential educational component, requiring students to possess practical competencies, creative thinking, and the ability to make independent decisions in complex situations. Consequently, the application of hands-on and project-based learning strategies is a critical pedagogical priority, fostering active, interactive, and outcome-oriented learning environments.

Materials and Methods. This study employed a multi-method approach that combined literature review, empirical observation, and statistical analysis to explore the integration of STEAM-based education into computer science instruction. Scientific publications, reports from UNESCO and OECD, and local studies on project-based and experiential learning were analyzed to provide both global and regional perspectives. Empirical observations were conducted in private schools and learning centers across Uzbekistan, examining lesson designs, student engagement,

and the outcomes of STEAM-integrated computer science courses. Statistical data from the Ministry of Education of Uzbekistan and the State Statistics Committee were used to identify patterns in the growth of private education institutions and trends in students' digital competencies.

Results. The results indicate that STEAM-based teaching models significantly enhance students' knowledge retention and practical performance. Specifically, lessons incorporating project-based and hands-on approaches improved knowledge acquisition by approximately 25–30% and increased practical task completion quality by 35–40% compared to traditional methods. Students involved in digital projects—such as web application development, mobile programming, data visualization, and robotic modeling—demonstrated substantial improvements in problem-solving skills, creativity, collaboration, and independent learning. The integration of digital platforms, virtual laboratories, interactive simulations, and collaborative tools enabled adaptive learning experiences and increased engagement, while competency-based assessment allowed evaluations to consider practical achievement, creativity, and problem-solving skills in addition to theoretical knowledge.

Figure 1

Comparative Student Performance in STEAM vs Traditional Computer Science Lessons

Teaching Method	Knowledge Retention (%)	Practical Task Quality (%)
Traditional	25	28
STEAM	55	63

These findings are consistent with global trends reported by UNESCO and OECD, confirming that STEAM integration strengthens interdisciplinary competencies and digital literacy, increases student motivation, and effectively prepares learners for the challenges of the 21st-century digital economy. National statistics indicate that as of 2024–2025, Uzbekistan has over 450 private general education schools and thousands of learning centers, reflecting a rapid expansion of the private education sector(pic.1). The adoption of STEAM strategies in these institutions supports the development of digital skills and prepares students for a labor market where approximately 60% of occupations will require direct engagement with information technologies by 2030, and over 70% of employers expect graduates to possess programming and problem-solving competencies.

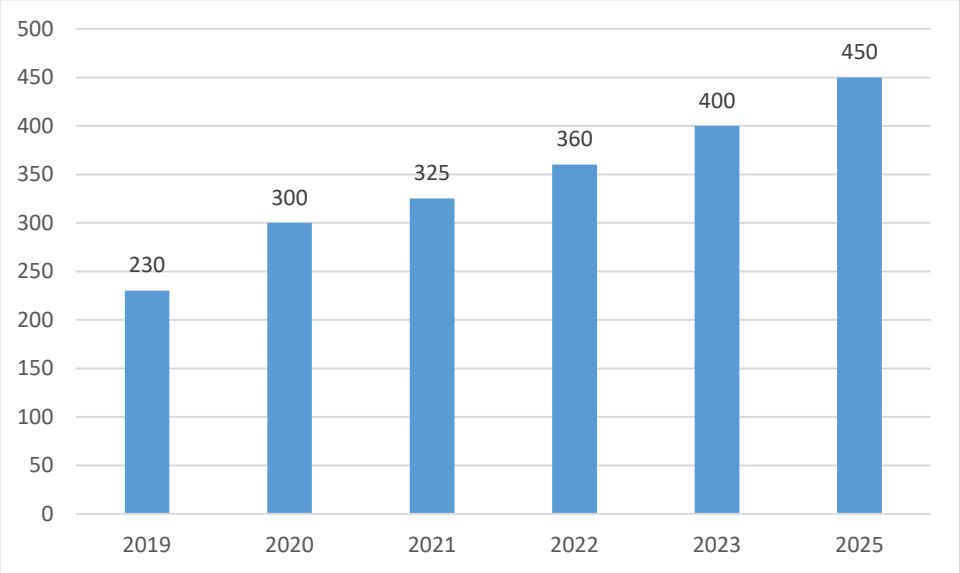


Fig.1 "Growth of Private Schools and Learning Centers in Uzbekistan (2019–2025)

Hands-on learning was observed to include laboratory exercises, simulations, and digital modeling activities where students directly engaged in coding, debugging, and optimizing software products. Project-based activities involved individual and group projects aimed at solving real-world problems, fostering innovation, initiative, and critical thinking. These practices positioned the teacher as a facilitator and mentor rather than a traditional knowledge transmitter, creating an educational environment conducive to experimentation, exploration, and collaborative learning. Observations revealed that when project-based and hands-on activities comprised 50–60% of instructional time, students' motivation, knowledge retention, and independent learning skills increased significantly, demonstrating a direct impact on learning outcomes and the formation of essential 21st-century competencies.

Discussion. The integration of STEAM-based teaching approaches in computer science education within private schools and learning centers in Uzbekistan demonstrates a significant shift in pedagogical practice towards fostering creativity, critical thinking, and problem-solving skills among students. The findings of this study are consistent with international research indicating that interdisciplinary approaches, which link science, technology, engineering, arts, and mathematics, enhance student engagement and deepen understanding of abstract concepts through applied learning. Unlike traditional lecture-based methods, STEAM emphasizes project-based learning, collaborative problem solving, and hands-on experimentation, allowing students to become active participants in knowledge construction rather than passive recipients.

The data indicate that institutions implementing STEAM methodologies observed higher rates of knowledge retention and practical task quality compared to traditional teaching methods. This aligns with global trends reported by UNESCO and OECD, where students exposed to project-based, integrative pedagogies show improved cognitive and meta-cognitive skills, as well as higher motivation and persistence in learning. Moreover, the use of digital tools, virtual simulations, and collaborative platforms reinforces these outcomes by providing interactive, adaptive, and visually engaging learning environments. Such digital integration is crucial in the context of Uzbekistan's rapidly growing non-state education sector, where private institutions have the flexibility to innovate and adopt contemporary teaching technologies.

The implementation of STEAM approaches also supports the development of 21st-century competencies, including analytical thinking, creativity, teamwork, and self-directed learning. Project-based activities, such as developing web applications, creating mobile apps, data visualization, or programming robotics models, not only improve technical skills but also promote entrepreneurial and innovative thinking. This is particularly relevant given the projected future labor market trends, where over 60% of professions will require digital competencies, and employers increasingly demand problem-solving and coding skills. In addition, the study underscores the pedagogical importance of creating a motivating and open learning environment, where errors are viewed as opportunities for growth and experimentation is encouraged. Gamification elements, design thinking tasks, and collaborative projects further enhance student engagement and allow learners to internalize complex concepts through meaningful contexts. These findings suggest that STEAM-based education not only improves academic outcomes but also cultivates intrinsic motivation, digital literacy, and professional readiness. The results also highlight that while STEAM integration significantly improves student outcomes, the effectiveness depends on teachers' competencies, availability of methodological resources, and institutional support for technological infrastructure. Teacher training and continuous professional development are essential to maximize the benefits of STEAM approaches. Moreover, adopting

assessment methods focused on competencies, creativity, and practical performance rather than rote memorization ensures that the evaluation process aligns with the goals of modern computer science education.

Finally, the findings imply that the widespread adoption of STEAM-based methodologies in Uzbekistan's private schools and learning centers could contribute to bridging the gap between formal education and the digital economy's needs. By emphasizing interdisciplinary learning, project-based experiences, and digital skills development, STEAM approaches prepare students to become innovative, adaptable, and competitive professionals capable of addressing complex real-world challenges.

Conclusion. The integration of STEAM-based approaches into computer science teaching in private schools and learning centers is a critical strategy for enhancing educational quality and preparing students for the demands of a digital society. Hands-on and project-based methodologies promote active learning, creativity, collaboration, and practical skill development, significantly improving both knowledge retention and the quality of task performance. The use of digital platforms, simulations, and collaborative environments facilitates adaptive instruction, while competency-based assessments ensure that evaluation reflects not only theoretical understanding but also practical application, innovation, and problem-solving ability. Empirical evidence from Uzbekistan demonstrates that STEAM implementation supports the development of students' digital competencies and readiness for 21st-century challenges. Expanding these pedagogical practices across private and public educational institutions will further strengthen interdisciplinary integration, foster innovation, and prepare a new generation of technologically adept, creative, and competitive professionals capable of thriving in the global knowledge economy.

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METHODOLOGICAL AND TECHNICAL FOUNDATIONS FOR DEVELOPING A DIGITAL EDUCATIONAL PLATFORM FOR TEACHING THE SCIENCE OF NANOTECHNOLOGY IN TEACHER TRAINING UNIVERSITIES

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Abstract. *The article examines the issues of improving the effectiveness of teaching nanotechnology in the context of modernizing modern education. The purpose of the research is to develop a methodology for creating a multifunctional digital platform (web and mobile application) that contributes to increasing students' activity in independent learning and visualization of the micro-world. Pedagogical and technical requirements for the platform, including UX/UI design principles, modularity, interactive simulations (C60, nanotubes, Brownian motion, etc.), and the role of virtual laboratories, have been substantiated.*

Keywords: *nanotechnology, digital educational platform, virtual laboratory, interactive simulation, UX/UI design, STEM education, modular learning.*

INTRODUCTION

The current stage of education development is characterized by the search for new theories and practices. This process will depend on the development of innovative innovations in the context of socio-economic development of society, that is, on new trends in the education system, directly relying on traditional methods. Higher education and pedagogy are an important factor in increasing student activity, the effectiveness and efficiency of the educational process, as they stimulate the development of the state, leading to research and a creative approach aimed at mastering the content of education, as well as independent learning. Currently, society's need for pedagogical personnel is increasing, and the teacher's activity and its content are leading to modernization through critical, creative development, the introduction of scientific achievements and best pedagogical practices. The digital software intended for teaching (the discipline of nanotechnology) - that is, a mobile application and web platform - should support interactive and individual approaches adapted to modern educational technologies, formed in the learning center. This section will develop the technical and pedagogical requirements, functional capabilities, and interface design criteria necessary for developing this product [10,11].

LITERATURE REVIEW

In the context of modernizing higher pedagogical education, the training of future physics teachers based on innovative scientific directions, including nanotechnologies, has become particularly relevant. The contemporary educational paradigm requires the formation of research, innovative, and professional-methodological competencies in future teachers, ensuring their ability to integrate new scientific knowledge and technologies into the educational process. The significance of this issue has been demonstrated in both foreign and domestic studies, approached from competence-based, activity-based, and interdisciplinary perspectives.

The research of V. S. Sharochenko focuses on the pedagogical possibilities of organizing project-based and research activities in the preparation of future physics teachers. The author demonstrates that integrating nanotechnology content into the curriculum fosters students' research competence, analytical and critical thinking, and practical skills for solving professionally oriented problems. Empirical results confirm the effectiveness of project-based learning as a key mechanism for enhancing the professional training of future teachers [1]. This study has substantial theoretical significance, as it scientifically substantiates the pedagogical principles for implementing advanced technologies in physics education.

In the works of Cho D. J., the preparation of highly qualified and leadership-oriented specialists in the field of nanotechnology is examined through an interdisciplinary educational approach. The author emphasizes the importance of developing not only technical knowledge but also managerial, communicative, and strategic competencies. Special attention is given to laboratory research, collaboration with industrial enterprises, and the application of educational models based on international experience, ensuring comprehensive training of specialists-leaders [2]. These findings highlight the scientific novelty of the approach, which lies in the integration of pedagogy, science, and management in preparing professionals for innovative sectors.

Foreign studies (Ivanova N. A., Kumar R., Patel S.) confirm the effectiveness of educational modules in nanotechnology and interdisciplinary integration in forming research competencies among future physics teachers. These works reveal the positive impact of project-based learning, experimental activities, and practice-oriented training on students' professional preparedness [5,6,7 and 8].

Domestic research in Uzbekistan also addresses the preparation of future teachers using modern educational technologies. In the dissertation of A. A. Rakhimov, the possibilities of developing professional competencies through innovative teaching methods and the organization of research activities are substantiated. The studies by B. M. Kholmatov demonstrate that systematic organization of students' research activities in an innovative educational environment contributes to improving their professional training and methodological competence [3, 4].

RESEARCH METHODOLOGY

We recommend that higher education institutions and pedagogical universities use this

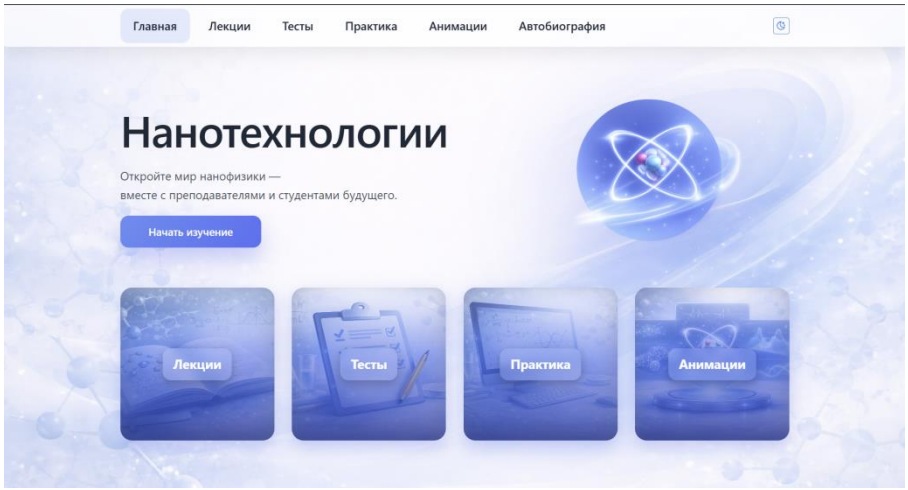


Figure 1. Web platform main page layout

platform for deeper understanding (the discipline of Nanotechnology) to further improve the quality of education and facilitate understanding, demonstrating invisible experiences in a virtual form (animation, simulators, virtual laboratory and video) using the latest technologies

when using the platform for teachers and students. In this regard, we have set ourselves the goal of teaching "Nanotechnology" to higher educational institutions and pedagogical universities.

MATERIAL ANALYSIS

1. Compliance with the approved curricula and textbooks for higher educational and pedagogical universities.

2. Theory of quantum physics, introduction to nanophysics, studying nanoscale particles, nanoelectronics, chemistry and physical nanotechnology, nanomaterials, operating principles of STM, TEM and ASM microscopes.

3. Create a collection of theoretical materials, problems, interactive simulations, and tests on each topic.

Ease of use (UX/UI design):

1. Adapted for web and mobile versions, simplified interface;

2. Understandable menu, in the form of a module on location topics;

3.Dark/light design modes, background sound, setting text size.

Technical:

1. Real-time interactive animation (C60, Carbon, Nanotube, Bravon Motions, Apply, Atomic Structure of Point Quanta);

2. Online - tests and an automated assessment system;

3. Step-by-step guide on virtual laboratories and problem-solving;

4. Database and User Statistics.

In the digital educational environment, content is not just a means of transmitting information, but as an interactive resource that attracts the reader and encourages active learning. The process of creating content on our platform, intended for "pedagogical" higher education institutions, is carried out in stages based on the curriculum. A full range of materials is being developed for all topics of the nanotechnology curriculum, including Introduction to Nanotechnology, (Equipment for Nanotechnology, Properties of Individual Nanoparticles, Carbon Nanostructures, Nanoelectronics, Biotechnology, Nanomedicine, Nanostructure of Nanoparticles) [12,13].

Sample of technical specifications

Section title.	**Function of the module.**	**Platform version.**
Introduction to Nanotechnology	Modeling + graphics +	Web + Android/iOS
Modern interpretation of nanotechnology	video lesson	Web + Android/iOS
A more accurate understanding of nanotechnology through a scientific platform	Interactive slides + tests + examples	Web + Android/iOS
Laboratory work	Virtual experiment + report in automated format	Web

RESEARCH RESULTS

In this process, special attention will be paid to the following types of content:

1. Animations

Animation allows you to show physical phenomena in motion in time and space.

At least one basic animation will be developed for each topic:

When studying nanotechnology, we can observe carbon C60, nanotubes, Brownian motion, nanosynthesis, and graphene.

Carbon C60 has been created.

Microscopic model of Brownian motion.

2.Modeling

Imitation allows students to independently control physical phenomena and provides the possibility of testing.

Consideration of the tunnel effect from the perspective of classical and quantum physics.

Understanding the tunnel effect using quantum physics and a virtual laboratory.

Review and deepen understanding of the principle of working in the laboratory.

3. Seminar and tests

After each topic, tasks are given to reinforce the knowledge:

15-25 closed test questions (in the form of OKV);

Questions related to the diagram (Match the pair, Label diagram);

Questions of discovery and addition;

Automatic result and recommendation after completing the work. An improved digital platform is not just content; a methodically sound technical delivery tool is formed as an innovative tool rich in opportunities and actively engaging students in learning.

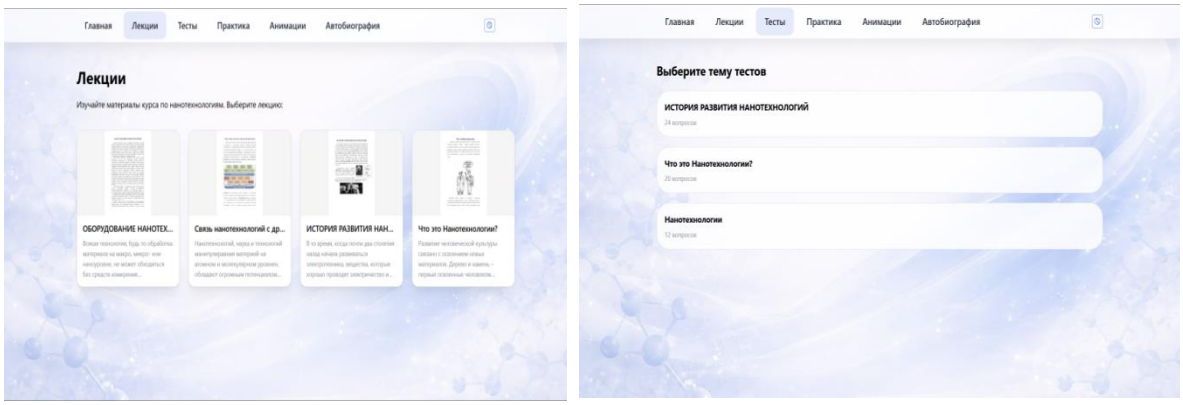


Figure 2. Modular view of user interface.

The proposed digital platform corresponds to modern teaching methods for students, provides visual, interactive, and independent learning, and creates a comfortable environment. Each topic is divided into modules based on the script, and the stages from introduction to reflection are developed sequentially. The platform is built on advanced approaches in the field of approaches - gamification, personalized assessment, and digital tracking systems.

Functional Structure of the Digital Educational Platform (Paraphrased, Academic Version).

1.Core Interface:

Each thematic module is organized into five progressive stages: introductory overview, conceptual/theoretical material, animated demonstrations, practical exercises, and evaluative assessments.

Distinct access levels are provided for learners and educators.

User Dashboard: tracks completed topics, accumulated points, and offers personalized learning recommendations.

2. Interactive Learning Content:

3D visualizations and simulations corresponding to individual topics.

Virtual laboratory experiences, including the simulation of phenomena such as the quantum tunnel effect.

Self-directed assessments designed to reinforce independent study.

3. Assessment and Analytics System:

Real-time monitoring of test performance.

Learning progress dashboards with weekly and monthly indicators.

Instructor Panel: comprehensive class performance statistics and difficulty-level analysis.

Adaptive recommendation engine: additional exercises are automatically suggested according to the student's mastery and progress level.

CONCLUSION AND SUGGESTIONS

This article details the conceptual, technical, and methodological foundations for developing a modern digital educational platform designed for pedagogical higher education institutions. The need for a comprehensive approach to advanced interactive technologies, UX/UI design approaches, modern programming environments, and methodological scenarios in designing digital educational resources has been substantiated. In conclusion, it can be said that the developed platform model can serve as a universal methodological basis not only for pedagogical higher education institutions, but also for other higher education institutions. The platform's scientific and methodological validity, its compatibility with technical solutions, and richness in elements that contribute to the individual development of students characterize it as a highly effective learning tool.

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DEVELOPMENT OF SCIENTIFIC AND CREATIVE COMPETENCES OF FUTURE PRIMARY TEACHERS

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Abstract. *This article deals with the problems of improving the methodology of developing the scientific and creative competencies of the future primary school teacher. Also, in the article, a formative method for improving the development of scientific and creative competences of future elementary school teachers, as well as the analysis of the fundamental views and theories of several foreign and our republic's pedagogic scientists were also considered. Scientific-creative approach, competence approach, the concepts of competence were explained in detail by the author, and this topic was analyzed from a pedagogical and psychological point of view.*
Keywords: *competence, scientific, creative approach, method, psychology, education, training, teacher, student, theory.*

INTRODUCTION. The scientific and creative competence of a future teacher is his constant search for answers to the questions "why?" and "how to do it better?" This process is carried out systematically on the basis of modern curricula developed by the Educational and Methodological Departments of higher educational institutions. The thoughts of the President of our country Sh.M. Mirziyoyev, "It is extremely important to solve another problem: this is the professional level of the teaching staff and professors, their special knowledge. In this regard, it is necessary to create an environment that actively supports the processes of obtaining education, spiritual and educational maturity, and the formation of true values, are of great importance. [1, 45-b]

The individual trajectory of independent educational activity of each teacher, who is a participant in the formative experience of improving the methodology for developing the scientific and creative competencies of a future primary school teacher, is formed from the starting point, which occurs in self-knowledge, when the work of identifying the need for scientific and creative activity is carried out, to the level of involvement in scientific and creative activity and self-organization for scientific and creative formation. From a psychological point of view, there is no significant difference between the scientific and creative activity of a scientist who discovers objective new laws of the surrounding world that are not yet known to humanity, and the productive thinking of a teacher who discovers new things only for himself, since they are based on psychic laws. Therefore, in the experiment, forms, methods, and tools of independent educational activity of future primary school teachers are selected that are similar to those available to future primary school teachers.

METHODS. The individual trajectory of independent educational activity of each teacher participating in the formative experiment on the development of scientific and creative competence of future primary school teachers is organized from the starting point of self-knowledge, the identification of the need for scientific and creative activity, to the level of involvement in scientific and creative activity and self-organization for scientific and creative formation.

From a psychological point of view, there is no significant difference between the scientific and creative activity of a scientist who discovers new objective laws of the surrounding world that are still unknown to humanity, and the productive thinking of a teacher who discovers new things only for himself, because the basis of both is psychological laws. For this reason, in the experiment, forms, methods, and tools of independent learning activities of future primary school teachers were selected that were similar to those available to future primary school teachers. However, just as the level of intellectual activity that leads to discovery varies, the conditions under which they discover new knowledge also vary. In order to clarify such differences, most researchers prefer to call such activities of schoolchildren "productive activity", and use the term "scientific and creative activity" to understand the highest level of intellectual activity of individuals who discover something fundamentally new, unique, original for human knowledge.

Competence - the Latin word "Competentia", the dictionary meaning of which in Uzbek is "a person who knows well", "has experience". Competence - the ability to do something effectively, the ability to meet the requirements of the job, the ability to meet the requirements of performing specific work functions [5]. Professional competence is the acquisition of knowledge, skills and qualifications necessary for the implementation of professional activities by a specialist and their high level of practical application. L.M. Mitina understood pedagogical competence as a harmonious combination of knowledge about the subject, teaching methodology and didactics, pedagogical communication skills and competence, as well as methods and means of self-development, self-improvement, self-realization. He distinguished the following three components in the structure of pedagogical competence: active, communicative and personal.

Creativity is manifested in the teacher's creativity, which determines the educational content of his professional activity, independent activity in the process of his work [3]. Creativity is a process that creates qualitatively new, original and unique scientific innovations in the process of teacher education. Any problem set in the productive creativity of the teacher is successfully solved, these aspects are manifested in the majority of teachers who are capable of creativity [5]. The teacher's heuristic creativity means the bold assimilation and promotion of innovations in professional activity taking place in the world, that is, the intensification of the formation of ideas, hypotheses on its basis and the consistent implementation of their closeness to reality, probability, reliability, and the ability to act boldly in a new situation, the development of thinking based on the process of thinking is observed. The teacher's creative creativity is embodied in the creation of new theories of social significance, he comes up with his own independent ideas and proposals, only skilled and experienced, qualified teachers can achieve this [4].

European sociologists call the positive state of a teacher's work "feeling the flow", that is, being completely immersed in their work and getting satisfaction from the process of work, which, in turn, testifies to the high internal reflexive state of the teacher [5]. The work of teachers who do not feel creativity and satisfaction from their work in the process of their profession often leads to inaction, rapid nervous exhaustion and irritability. The development of scientific and creative competence of future primary school teachers requires the inclusion of scientific and creative tasks, non-standard situations and the corresponding forms, methods and means in independent educational activities. Professional scientific and creative needs and motivation play an important role in the development of scientific and creative competence of future primary school teachers. The nature of scientific and creative activity; The direct participation of teachers in the selection of non-standard tasks, the use of situations that are important for the individual in which the value-motivational, constructive and reflexive-purposeful components of the scientific and creative

competence of future primary school teachers are updated, are considered to be determining factors for the development of the scientific and creative competence of primary school teachers.

RESULTS. We will consider in more detail the stages of the technology for developing the scientific and creative competence of future primary school teachers.

• At the first - diagnostic stage, the educational institution psychologist works with teachers who have expressed a desire to participate in the creative workshop (experimental group) and a group of volunteer teachers from primary schools (control group) and identifies the initial level of development of the scientific and creative competence of future primary school teachers and the existing conditions for its development. Diagnosis makes it possible to establish whether the phenomenon under study meets certain standards and criteria.

In the process of diagnosing and assessing the level of development of the initial scientific and creative competence of future primary school teachers, the pedagogical conditions necessary for optimizing the process of developing the scientific and creative competence of future primary school teachers are identified and clarified; the features of the development of scientific and creative activity and its individual psychological and pedagogical mechanisms are studied. In particular, the diagnostic information obtained at this stage serves as "input" information for the subsequent design phase. The purpose of the diagnostic stage is to develop the need for the development of scientific and creative competence of future primary school teachers. At this stage, the practice of analyzing and sharing experience with colleagues is carried out. At the first stage, priority is given to partial-search methods, which involve partially explaining new ideas by setting problems and tasks; Problematic situations are created in the educational and cognitive work of the participants of the creative workshop.

A skilled teacher conducts self-analysis and notes professional difficulties that arise in the activities of the workshop participants. Based on the results of the work, all participants of the workshop, including the master teacher, develop an individual educational path or an individual plan for independent learning to overcome professional difficulties, taking into account the results of the diagnosis, needs, abilities, and level of readiness for independent scientific and creative activity. This technology places a special emphasis on the development of independent learning activities, independent goal setting, plans, strategies, and self-assessment criteria. First, each teacher applies the experience of a master teacher in practice, studies the tested examples and standards described in methodological works and recommendations, uses two-way communication, adjusts his actions based on the results, and works on the basis of "methodical application", "template" and the experience of a master teacher. After that, the teacher proceeds to the task of finding something new: either for himself, innovative non-standard ways of solving pedagogical problems, or for himself and others, creating and finding original approaches, individual methods that recreate a certain pedagogical experience.

The novelty of the problem requires the use of new methods, such as the introduction of leaps and bounds, heuristics, search patterns, the increased role of semantics, and the content analysis of the problem. In this process, along with verbal-logical, well-understood generalizations, intuitive-practical generalizations that initially did not find their corresponding counterpart in the word are very important. They arise in the process of analyzing simulated situations, solving concrete practical problems, and analyzing real actions with objects or their models. This facilitates the search for the unknown, but this search process is carried out outside the clear sphere of consciousness, in an intuitive manner. The first stage is characterized by a positive attitude towards knowledge and the systematic and independent satisfaction of the

scientific and creative need for knowledge, which arises in the absence of an integrated independent educational technology, based on the situation.

DISCUSSION. The development of scientific and creative competencies of future primary school teachers is one of the priority tasks of the modern education system. This process involves the formation of not only teaching skills in students, but also the ability to create new pedagogical ideas and find creative solutions to problems.

The main areas of development of this competency are as follows:

1. Orientation to scientific and research activities

It is important to involve students in small scientific research from their student years.

Coursework and graduation qualification works: Orientation of topics not only to theoretical, but also to real problems in school practice.

Scientific circles: Cultivation of analytical thinking through circles such as "Young Pedagogue", "Creative Teacher".

2. Formation of creativity and creative approach

A primary school student understands the world through games and images. Therefore, the teacher:

Pedagogical innovations: Mastering non-traditional teaching methods (case studies, project-based learning, STEAM technologies).

Design thinking: The ability to design lesson plans in a visual and interesting way.

3. Information and communication technologies (ICT)

According to the 2026 educational standards, scientific and creative competence is inextricably linked with digital literacy:

Creating electronic educational resources (interactive games, video lessons).

Effective use of artificial intelligence capabilities in the educational process (for example, in optimizing the lesson plan).

4. Independent learning and reflective skills

A teacher should not stop working on himself:

Reflection: Critically analyze his own work and look for new ways to eliminate shortcomings.

International experience: Learning to prepare lesson plans that meet the requirements of international assessment programs such as PISA and PIRLS. At the first stage, within the framework of the value-motivational component, the manifestation of primary interest in scientific and creative activity as a value; within the framework of the cognitive-constructive component, the attempt to build new knowledge and transform information in content and meaning will be the result of the development of the scientific and creative competence of the primary school teacher in independent educational activities. Within the framework of the reflexive-purposeful component, professional difficulties in achieving the goal are identified. The goal of the second - constructive - stage is to develop the scientific and creative cognitive activity of future primary school teachers.

The master teacher will conduct a planned demonstration lesson, self-analysis, and invite teachers to participate in the "Master Class +" project, which consists of searching for scientific and creative ideas for development on such a topic, using the master teacher's ideas and their own.

• In the second stage, research methods are mainly applied, such as practical methods that provide deeper knowledge about the essence and characteristics of subjects, establish cause-and-effect relationships, organize the work of the creative participants' thoughts, and are implemented

through partial-search and project-research activities, and observation, experimentation, exercises, and scientific and creative work serve as sources of information. In the second stage, a non-standard approach to the educational process is developed, which is properly organized and produces high-quality results. The content of the second stage is based on the joint scientific and creative activity of teachers and workshop participants, and the result of this activity is the selection of forms, methods and means of organizing educational activities that correspond to a new topic or goal in a new master class or lesson project, and the prediction of the final results. The work of the creative team involves qualitative changes in the job system, which can lead to a qualitative change in the process and results of the future primary school teacher's activities. This situation indicates the priority of instructional (demonstrative)-practical, explanatory-conversational methods. Instead of ready-made examples of knowledge, information independently selected and processed in the process of working on the topic of the master class is used as a source of new knowledge.

CONCLUSION. As a result of improving the methodology for developing the scientific and creative competencies of future primary school teachers, their other activities will also improve. It should be noted that the development of scientific and creative competencies is a gradual and continuous process. It begins in a higher educational institution and continues in the workplace. In forming an individual style of pedagogical activity, each higher education teacher can choose for himself any heuristic forms and methods of teaching students. At the same time, the results of their application should ensure that they have a positive impact on the development of professional competencies of future primary school teachers based on scientific and creative approaches.

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DEVELOPMENT OF STUDENTS' CREATIVE COMPETENCE

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Abstract. *This article is devoted to the issue of organizing independent activities of students in professional education institutions. The author examines the issues of organizing independent activities of students, the tasks that teachers must solve in the process of independent activities of students, analyzes the views of various authors, lists the most common types of independent activities of students in professional education, reveals the importance of independent activities in forming professional skills of future specialists, and suggests focusing on the problems that currently exist in this area.*

Keywords: *creativity, independent creative activity, technology, formation, competencies, ability to solve problems independently, creativity, reproduction, heuristic approach.*

Introduction

A feature of the current stage of scientific knowledge development is the growing interest in the problem of creativity as an element of creativity, due to its role in the formation of a multifaceted personality capable of producing a large number of new ideas. Many countries around the world are concerned about the problem of creativity and the search for ways to develop it in the lifelong education system. According to K. Robinson, creativity is not a whim, a luxury, or an abstraction, but a necessity dictated by the times. Therefore, the main task of a teacher is to help a student become a free, creative, and independent individual. The problem of creativity is the subject of active research related to the processes of self-improvement and self-realization.

Creativity is a level of creative talent and ability to create that constitutes a relatively stable characteristic of an individual. Creativity is understood as an internal potential and ability to create (N. Rogers, N.Yu. Khryashcheva, S.I. Makshanov, A.J. Cropley). The word "creativity" comes from the Latin "creare," which means to generate, create, and from the English "creative," which means creative and productiveThis potential is revealed and developed through students' independent activities. Currently, independent work is becoming the leading form of organizing the educational process, and this raises the issue of its activation. However, the activation of independent work does not simply involve increasing its volume in terms of time, but rather aims to enhance its effectiveness while saving students' time and effort [13].

The problem of organizing students' independent activities in the learning process is one of the most pressing issues in modern pedagogy. The current situation requires a reevaluation, correction, and new pedagogical solutions for the established methods and forms of designing and implementing students' independent work. The goals and objectives of education are currently changing, with a shift from "knowledge acquisition" to "competence development" and a focus on a person-centered approach.

The relevance of the problem of students mastering methods of independent cognitive activity is also dictated by the fact that during the learning period, the foundations of professionalism are laid and the skills of independent professional activity are formed. Modern society needs specialists who can quickly make unconventional decisions, act creatively and

independently, and contribute to the development of a particular industry. Independent work is a form of educational and cognitive activity that demonstrates a student's organizational skills, determination, creativity, and responsibility.

Independent student activities contribute to the development of initiative, discipline, accuracy, and a sense of responsibility, which are essential for future professionals in their professional activities. Independent activity of students is considered as purposeful self-organized, self-managed activity, structured by the student himself, built on deep internal motives. In modern conditions, the ability of a student to independent activity acquires a qualitatively new meaning, which is determined by the readiness of a university graduate to quickly adapt to practical professional activity in intensively changing conditions.

The fact that independent work of a student is the main way of educating independence and developing professional competence, today no one doubts. Independent activity is such work that is carried out without the direct participation of the teacher, but on his assignment, in a specially provided time for this, while students consciously strive to achieve the set goals, using their efforts and expressing in one or another form the result of mental or physical (or both) actions.

It is through independent work that a high culture of mental labor is developed. In the process of such work, the individual abilities, inclinations, and interests of students are most fully revealed, which contribute to the development of the ability to analyze facts and phenomena, and teach independent thinking, which leads to creative development and the creation of one's own opinions, views, and positions. A theoretical analysis of pedagogical literature shows that many researchers (N.G. Dair, B.P. Esipov, G.E. Kovaleva, L.M. Pimenova, L.A. Ponomarev, and others) identify independence as a personality trait that serves as the foundation for this approach.

The problems of independent work of a student at a university are covered in scientific and methodological literature. These problems are studied by G.S. Zakirov, V.D. Zemzyulina, E.V. Zakharova, and I. Kovalevsky. However, unfortunately, this literature does not yet provide sufficient coverage of the problems and features of independent work of a student in the context of implementing a multi-level training and education system in university life. Let's take a closer look at the concept of "independent work." According to a modern dictionary on pedagogy, independence is defined as the ability to set a specific goal, persistently pursue it on one's own, take responsibility for one's actions, and act consciously and proactively, not only in familiar situations but also in new circumstances that require unconventional solutions. Independence is not innate; it develops as a person matures and has its own characteristics at each age stage.

In this regard, the idea of N.G. Dair is interesting, who notes: "... it is necessary to see the emergence of independence, its development, the stages of its complexity, and to correlate the stages of complexity of various types of independent work with this". In our opinion, the above statement contains a fruitful idea about the stages of independence demonstrated by students when performing less complex and more complex types of independent work. I. Zinoviev notes that in higher education, the concept of independence is associated with the idea of freedom in choosing the ways and means of solving the problems that a person faces. This means that students should perform independent work without guidance or assistance from university professors. However, it should be noted that excessive independence can reduce the effectiveness of the student's independent work. There is also a view of independent work that equates it with self-education, substitutes it, and therefore loses its specific features.

It is necessary to distinguish between the concepts of "independent work" and "self-education." Self-education is a system of continuous knowledge acquisition, which goes beyond

the scope of academic work at a university. However, the objectives of self-education are much broader than those of independent work. Self-education, unlike independent work, is not only a form of acquiring, deepening, and acquiring new knowledge during university studies, but also a form of continuing education for young professionals after graduation. Consequently, the concept of "independent work" and the concept of "self-education" have different meanings. Mixing these concepts leads to confusion in the choice of means, forms, and methods of their practical implementation. In our opinion, independent work should be understood only as an integral part of self-education, which has broader goals.

Some scientists consider independent work as a means of developing generalized skills, cognitive independence, creative activity, and personality socialization, and associate it with the ability to self-organize. Independent work is defined by some authors as a teaching method; by others, as a learning technique; and by still others, as a form of organizing educational activities. It should be noted that the most complete definition of independent work is given by V.I. Andreev [6]. His point of view is based on the fact that a wide variety of teaching methods and techniques can be used in the process of independent work, and therefore, in his opinion, it is incorrect to use the term "method" as a generic term for independent work. He also believes that the term "means" is not the main term, but rather an auxiliary or specific feature, and cannot be used as a generic term.

Thus, independent work of students is a form of organizing their educational activities, carried out under the direct or indirect supervision of a teacher, during which students perform various types of tasks predominantly or completely independently in order to develop their knowledge, skills, and personal qualities. Independent work is a type of educational activity that involves a certain level of student independence in all its structural components: from setting the problem to carrying out control, self-control, and correction, with a dialectical transition from performing the simplest types of work to more complex, search-oriented tasks, and a constant transformation of the guiding function of pedagogical management into forms of orientation and correction, with a gradual transfer of all functions to the student. I believe that this approach is in line with the reality and nature of independent work.

Independent work in the modern educational process is considered as a form of organization of learning, which is able to provide independent search for the necessary information, creative perception and comprehension of the educational material during classroom activities, various forms of cognitive activity of students in classes and during out-of-class time, development of analytical abilities, skills of control and planning of study time, development of skills and abilities of rational organization of study work.

A survey of students aimed at self-improvement revealed several problems faced by students. It was found that 18% of students have difficulty in allocating their time, 60% of students noted that they do not have enough time, and 15% of students complained about difficulties in completing independent work. This indicates that the main problem is a lack of time. To understand the reality, let's try to calculate the student's time. Students usually have 3-4 classes per day (from 8:30 a.m. to 3:30 p.m.), followed by consultations (1-2 more hours), which means that they leave the institute at 4-5 p.m. Many students take about an hour to get to their place of residence. They can also allocate two more hours for rest and meals. Therefore, by 7-8 p.m., students can start their independent work at home. Many students have various household duties that also take up time. After a busy day, students may experience fatigue, exhaustion, and so on.

Therefore, it can be concluded that only the most energetic and healthy students will be able to engage in independent work at home. However, there are usually only a few such students. The remaining students will need more time to recover their energy. So, how can we find a solution to this problem? There are two main approaches to independent student work:

- The first is to increase the role of independent work in the classroom. This requires teachers to develop methods and forms of classroom organization that can ensure a high level of student independence and improve the quality of education;
- The second is to increase students' activity in all areas of independent work during extracurricular time. However, as mentioned above, this is associated with several difficulties, primarily due to the unpreparedness of both students and teachers. Students do not attend consultations assigned by teachers, leaving the work on control and course assignments for the end of the semester. Additionally, the existing methodological support for control and course assignments is insufficient for effectively organizing independent work.

It should be noted that the ineffectiveness and slowness of extracurricular independent work is caused by the teacher's insufficiently clear organization of students' cognitive activity in extracurricular independent work. Often, the teacher does not focus students on mastering the basic knowledge and skills, does not select the educational material for the assignment clearly enough, and includes extensive assignments in extracurricular independent work that must be completed within a short timeframe. All of these issues reduce the effectiveness of independent work and lower students' cognitive motivation.

Methodology

The traditional learning system is not always able to develop a person's creativity, as it is based on memorizing information and accumulating facts. In most cases, the creative aspects of a person's personality are suppressed in everyday life. Therefore, the development of creativity can only be achieved in a specially organized environment, and it is necessary to introduce special independent tasks into the learning process that allow for the development of creative thinking, creativity, and the further use of creative abilities. The development of creativity is individual for each student, so it is advisable to prepare differentiated tasks.

To develop creative thinking means to form and improve mental operations: analysis, synthesis, comparison and generalization, classification, planning, abstraction, and to have such characteristics of thinking as criticality, depth, flexibility, breadth, speed, variability, and to develop imagination and to have knowledge of different content. To form creativity as a personal, and not only behavioral property, a specially organized environment is required. The so-called "local" methods of developing creativity (for example, solving non-standard problems) are certainly useful.

However, because of their application, students simply learn some new ways of solving problems and subsequently reproduce the actions they have learned (for example, teams that participate in intellectual competitions are specially trained). In such cases, creativity is manifested in response to external influences and in certain circumstances, rather than as a result of the individual's personal needs. Therefore, in order to develop creativity as a personal trait, a special environment is needed that provides a multifaceted and systematic impact on the student. Independent work is mandatory for the development of creativity, and it is determined by the curriculum. In the structure of educational activities, it takes up from a third to two-thirds of the

total study time. The organization of independent work is systematic throughout the entire period of student education. An important aspect of independent work is that it not only solves educational tasks, but also addresses the issue of self-development and self-improvement for the student.

In the modern educational process, the student is not just a consumer of information, but a creative seeker of knowledge. At the same time, the teacher's task is not only to transfer information in a ready-made form, but also to encourage the student to engage in independent cognitive activity, to form the skills of independence in obtaining knowledge, as this is necessary for professional activity and career growth.

There are general principles for organizing independent work:

— the principle of interactive learning (providing an interactive dialogue and feedback that allows for control and correction of the student's actions);

— the principle of developing a student's intellectual potential (forming algorithmic, visual-figurative, and theoretical thinking styles, the ability to make optimal or varieties decisions in a complex situation, and the ability to process information);

— the principle of ensuring the integrity and continuity of the didactic learning cycle (providing the opportunity to complete all parts of the didactic cycle within a topic, section, or module).

There are also specific principles for organizing independent work for university students:

- the principle of individualized learning, which is manifested in the teacher's consideration of the student's individual psychological characteristics when providing pedagogical support for independent work;

- the principle of regulation of education, which reflects the need to choose a learning strategy and plan the organization of students' independent work (including methodological developments for students' independent work);

- the principle of relying on basic knowledge and skills, which requires students to have minimal technical skills and the ability to use their free time effectively for independent work;

- the principle of advanced learning, which ensures that independent work is focused on activating and developing the student's cognitive abilities, as well as on developing the ability to independently predict, choose, and solve didactic problems, and acquire knowledge in collaboration with other students studying the same discipline or course;

- the principle of feedback, which allows participants to discuss and correct problematic issues in a given discipline or course in a timely manner;

- the principle of external control and self-assessment, which includes the exchange of information not only with the teacher, but also with other students studying the same discipline or course;

- the principle of scientificity, which allows participants to independently solve the assigned tasks at the current level of scientific knowledge;

- the principle of visibility, which involves presenting information in an accessible form;

- the principle of linking theory with practice, which makes it possible to solve situational problems;

- the principle of accessibility and feasibility of independent work;

- the principle of taking into account the complexity of academic disciplines and the optimal planning of independent work;

Practice shows that students differ in their level of readiness to implement the requirements for independent work. There are two main groups of students:

- the first is characterized by the fact that its representatives are focused on completing independent work tasks and possess universal educational competencies that allow them to successfully meet the requirements for completing independent work (the ability to understand and remember acquired information, think logically, reproduce material in writing and orally, conduct measurements, calculations, and design).

- students in the second group do not have a stable orientation towards continuous independent work when mastering educational material, and they have a low level of development of universal educational competencies and self-organization skills.

Given this situation, the teacher should develop differentiated tasks that differ in complexity when organizing independent student activities. To do this, it is necessary to study the students' capabilities and, based on the results, divide the students into groups based on their readiness for independent activities. Then, for each group, develop a specific development program and a set of tasks for independent activities. This approach will optimize the process and increase the effectiveness of independent activities.

Independent student work can be organized at different levels, depending on the didactic goals and the students' level of preparedness:

1. Independent work based on a sample or reproductive independent work — low level of independence. require the transfer of a known solution method directly into a similar or remotely similar intra-subject situation. These works are performed on the basis of "specific algorithms" previously demonstrated by the teacher and tested by students when performing previous tasks, thus, performing independent work of this type, students make a direct transfer of a known method into a similar intra-subject situation. In this case, all the student's actions are aimed at mastering a set of independent activities. The fundamental possibility of mastering independent work methods stems from the similarity of the conditions of this task and previously known tasks (from the similarity of the subject area and the relationships between objects), and the appropriateness of using the corresponding methods either stems from the conditions of the task or is determined by the teacher's instructions. Thus, reproducing independent work contributes to the formation of skills and abilities, as well as the memorization of independent work methods in specific situations.

2. Independent work of the reconstructive-varieties type is a threshold level of independence. It allows you to meaningfully transfer knowledge to typical situations, teaches you to analyze events, phenomena, and facts, creates conditions for the development of students' mental activity, and forms the methods and techniques of cognitive activity.

3. Heuristic independent work or partially search-based work is an advanced level of independence. It contributes to the formation of students' creative personalities. When performing this type of work, students constantly search for new solutions, generalize and systematize their knowledge, and apply it to completely unconventional situations.

4. In-subject and inter-subject research or creative independent work is a high level of independence. This is the highest level in the system of independent work. To perform such independent work, you must be able to transform and transfer knowledge and problem-solving methods, independently develop new problem-solving methods, determine the content, purpose, and develop a plan for solving a learning task. Independent work of this kind usually contains cognitive tasks, according to the conditions of which it is necessary: to analyze unusual situations; to identify the characteristic features of the educational problems that arise in these situations; to look for ways to solve these problems; to choose the most rational from the known ways,

modifying them in accordance with the conditions of the learning situation. Heuristic and creative independent work have great opportunities for the development of students' creativity.

Conclusions

Thus, independent work is a special means of teaching that, firstly, corresponds to a specific goal and task in each specific learning situation, secondly, forms a certain amount of creative competence in students to solve cognitive problems, thirdly, develops a psychological attitude in students to independently and systematically expand their knowledge, fourthly, is an essential tool for pedagogical guidance and management of students' independent work, and finally, is an essential condition for self-organization and self-discipline in students' cognitive activities. Solving the problems of forming a creative personality of a graduate, capable of self-development, self-education, independent innovative activity, is impossible through the simple transfer of ready-made knowledge from the teacher to the student. It is necessary to transfer the student from the position of a passive consumer of knowledge to the position of an active subject of the educational process, participating in the formation of their competencies, able to formulate a problem, analyze ways to solve it, find the optimal result and prove their point of view.

In this context, it becomes clear that the status of independent work in the modern educational process is fundamentally changing. The increased importance of independent student work requires a fundamental reevaluation of the educational process at universities, which should be designed to foster learning skills, self-development, creativity, and various adaptations to future professional activities.

The effectiveness of independent work in the learning process largely depends on the conditions of its organization, the content and nature of the tasks, the logic of their construction, the source of knowledge, the relationship between the existing and expected knowledge in the content of the tasks, and the quality of the results achieved during this work. However, the following questions arise: What are the optimal conditions for students' independent activities? How independent should a student be in such activities? How can a differentiated approach be implemented in organizing students' independent activities? What technologies are effective in different situations? How can students' independent activities be organized to promote creativity?

To solve these problematic issues, it is necessary to approach them individually and, first of all, to find the level of independence that will give the best results and help the student's development. It is also important to study each student's capabilities and develop differentiated tasks based on their complexity. Finally, it is necessary to develop effective technologies for organizing students' independent activities. One option for implementing new technologies is the credit-based education model, which allows for the continuous updating of initial information in the form of changing examples and statistical data, as well as the modification of model parameters, which helps to better understand and enhance the effectiveness of students' independent work.

It should be noted that independent work by students is only possible if the student has a strong interest and desire to acquire knowledge. In this case, the most effective motivator is internal motivation, which comes from the activity itself. This can be seen as an interest in learning and creating conditions for the successful development of the student's intellectual skills, where the perception of new information evokes positive emotions and the activity itself encourages learning.

To work with the acquired knowledge, skills, and abilities, teachers often offer creative tasks, as they contribute to the development of the ability to use knowledge to solve relevant

practical problems. For each creative task, the teacher must develop regulatory requirements, and for certain groups of students, they must also consider the level of creative activity. If necessary, the teacher should provide guidance on how to complete these tasks. Such independent work is interesting if the tasks are novel, if they involve research using new methods of research or measurement, and if they involve active thinking or practical activities related to finding the most efficient ways to complete the tasks, analyzing the results, and writing a report.

The organization of independent work is an effective means of activating students' creative independence. Students' independence and activity are closely related, as independence is the highest form of activity that is determined by the nature and method of students' activities. The basis of students' independent work is a conscious approach to the learning process, which is the highest degree of thinking. At every stage of students' independent work, clear, timely, and effective control and verification of knowledge acquisition, as well as the level of skill development and ability enhancement, are necessary.

To ensure the effectiveness of students' independent work, it is necessary to:

- justifying the combination of classroom and independent work;
- methodologically correct organization of the student's work in the classroom and outside of it;
- providing the student with the necessary methodological materials in order to transform the process of independent work into a creative process;
- using active learning methods;
- monitoring the organization and progress of the student's independent work and taking measures to encourage the student for its high-quality performance.

The importance of students' independent work cannot be overestimated. It is only through independent completion of assignments that knowledge is consolidated. Students begin to understand the educational material, and they develop a desire to learn. The goal of students' independent work is to teach them how to work with educational material and scientific information in a meaningful and independent manner, and to instill the ability to continuously improve their qualifications. The decisive role in organizing students' independent work belongs to the teacher, who should work not with a student "in general" but with a specific individual, with their strengths and weaknesses, individual abilities, and inclinations. The teacher's task is to see and develop the best qualities of the student as a future highly qualified specialist.

A student's independent work is intended not only for mastering a specific discipline, but also for developing certain skills in educational, scientific, and professional activities, as well as the ability to take responsibility, solve problems independently, and find constructive solutions to crisis situations. Independent work is not aimed at providing knowledge. It is aimed at teaching students how to independently search for and develop creativity.

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FOREIGN EXPERIENCES IN DEVELOPING THE EFFECTIVENESS OF VISUAL ARTS LESSONS AND THEIR COMPARATIVE ANALYSIS

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Abstract. *This article discusses the essence of foreign experiences and their comparative analysis in developing the effectiveness of fine arts lessons, an issue that is considered relevant in our time.*

Keywords: *pedagogue-artist, didactic principle, competence, professional, pedagogical technology, systematic, systematic, sequential, cognitive-active, visual, creative, life image, architectural art, integration, perspective, plein air, artistic-aesthetic.*

Introduction

The direction of the future generation towards a certain profession has a rich historical experience. In particular, the tradition of "Master - Disciple", which has been effectively used in the East, is gaining a modern content today. In particular, the use of historical experience is gaining priority in the field of fine and applied arts. Regarding the education received by our head of state Sh.M. Mirziyoyev in his youth: "In order to raise children as spiritually and physically mature individuals from a young age, schools should be provided with literary materials, especially in primary grades, new content should be added to music, visual arts and physical education classes." It is not for nothing that the words "giving is important" [1] are said.

The concept of the need for familiarization with the paintings and drawings of world-famous artists in improving the professional and methodological training of future teachers of fine arts is important as one of the important components of the historical pedagogical roots of modern artistic and aesthetic education. The activities of scientists and writers, poets, tourists, such as Beruni, Ibn Sino, Ulugbek, Goethe, Hugo, Anderson, Pushkin, Tagore, Mikluho-Maclay, Mendeleev contain valuable information about the methodological foundations of professional learning and teaching. The French philosopher Diderot said: "In any country where drawing is taught as well as reading and writing, this country will overtake and leave behind any other country in all fields" [2;11-b].

A future art teacher is required to show a special interest in the study of the world, life, nature, and especially the history of peoples, as a science. After all, art has a long history, and its emergence dates back to the era of primitive society. At this time, people drew pictures of people and animals on the stones, and cut them to make sculptures of different appearance and content. Since ancient times, people have believed that art, natural phenomena, and people's interactions, activities, and behavior have a positive effect [3; p. 250].

Indeed, even today, not only the artistic-aesthetic taste of people is developed, but also their historical thinking is enriched through the works of fine art. Therefore, the works of art depicted on the historical theme are primarily important for their educational functions. A visual arts teacher should understand the importance of not only visual arts, but also biology, history, geography, oral

folklore, various preserved sources, physics, chemistry, computer science, as well as current achievements in the sciences of history and art, in the composition of the image. It is necessary to reach. In particular, the place of Egypt and Greece in the development of world visual art is also significant.

Since this period, skilled teacher-artists have passed on their experience to subsequent generations in various ways, and this, in turn, is connected with the continuity of the teacher-student tradition. The future fine art teacher should promote the knowledge and skills they have acquired in the creation of any works of art in special schools. In this sense, historical sources on the teaching of drawing in ancient Egypt are considered a particularly valuable source of information in modern higher artistic and pedagogical education. In Egyptian schools, drawing and painting lessons were taught in an integrated manner. Graduate school students were required to design a house or building, measure the surface of surrounding water bodies and agricultural fields, and draw them on paper. The teachers of that time taught drawing to children not on the basis of observing nature, but by copying from a model, scheme [4;226-b].

According to the Italian architect, artist, writer and scientist, artist L.B. Albertini: "The writing and painting of the Egyptians existed six thousand years before Greece" [5; p. 18]. Therefore, from these words of L.B. Alberti, we can conclude that the development of Egyptian fine arts preceded that of Greece by six thousand years. The fundamental work of the Russian scientist N.N. Rostovsev on the history and theory of the training of future teachers of fine arts, as well as practical methodological foundations, has not lost its relevance even today. The most important rule in the process of training is the development of observational skills. According to his opinion, it will be possible to achieve a high result by practicing more in nature. After all, the professional and methodical competencies to see and feel the original views of existence, perspective reductions are developing in the future fine art teachers through painting according to nature, plein air practice.

Among the European pedagogues, such scholars as I. V. Goethe (Germany), I. G. Pestalozzi, I. Schmidt, P. Schmidt (Switzerland), A. Dupuy and F. Dupuyvdar (France) in the teaching of fine art classes in higher education institutions as a separate academic subject and its improvement. place is incomparable [6; 12-b]. In the 18th and 20th centuries, the methods of teaching fine arts in European schools began to improve and develop. By the 20th century, pedagogues such as B.G.Ananev, A.Belkin, A.V.Bakushinsky, Dzh.Gilford, V.Í.Gladkýkh, N.G.Chernýshevský, A.N.Leontev, YE.Í.Ígnatev made a significant contribution to the teaching of fine arts and the creation of its methodology. added.

During that period, a number of necessary literatures for teaching the development of fine arts began to be published. In particular, the literature created by A.V. Bakushinsky is particularly emphasized [54; 200-b]. In his literature, he outlined the general rules, methods, and techniques of fine arts. During the period when the German scientist J. Duvdar created a new biogenetic theory in visual arts [7; p. 200]. In his opinion, students should not interfere with artistic creation. In their views, they defined that children should be free to create, and they put forward views against directing children's creativity. Later, this idea was called "Free Education".

Fine art appeared in Russia as an academic subject at the beginning of the 18th century. Drawing in educational institutions was not intended to train artists, but rather to be a necessary profession for professional activity. Russian painter M.N. Sokolnikova's first textbook "Painting course" was based on "drawing according to nature" and realistic painting. In this textbook, it is intended to improve the knowledge gained by mastering the rules of working with materials such

as wire, cardboard, plaster, reducing perspective, and working with methodological visual tools [8; 256-b].

It is necessary to feel that the profession of the future teacher of fine arts is the most proud and, in essence, the most important for society. The teaching profession provides the students with the knowledge they need for social life and their lifelong activity. They will be armed with high and noble virtues, they will be educated to be useful people for our state and to be individuals who can contribute to the development of our society. The younger generation will be taught the historical experience of our great ancestors as an example. Young pedagogues should not forget that they should educate young people through the spirituality and culture of our country, traditions and customs. In this regard, along with modern knowledge, historical knowledge, knowledge of historical artistic and aesthetic values, is important as one of the important conditions for improving the professional and methodological training of a future specialist.

The use of historical sources in the teaching of visual arts, especially composition, is of particular importance in the higher artistic-pedagogical educational processes. In particular, Leonardo da Vinci, Raphael Santi, Michelangelo, Í. Methodical approaches to understanding, analyzing and evaluating the composition of the paintings of artists such as Repín, V. Suríkov are considered one of the important components of the professional training of the future fine art teacher. The purpose, content, methods, forms and means of education and the lesson plan in improving the system of professional and methodological training of future teachers of fine arts in the process of studying, comparative analysis of historical experiences and applying them in modern conditions It provides opportunities for optimal organization of (developments). This is a synthesis based on the historical and modern principles of the methodology.

It is important for a future art teacher to be, first of all, a person with a refined taste, a master of his field, and not only a skilled teacher, but also a creative one. Therefore, studying the historical and pedagogical roots of the field allows for a comprehensive approach to the issue. This includes the following:

- thorough study of the history and theory of national and artistic traditions of art, practical and architectural art;
- improving and developing the skills and abilities of specialized disciplines;
- to relate pedagogical and psychological situations to visual art during their activities;
- to study and apply new pedagogical technologies in the field of specialization around the world;
-free creative work in various types and genres of fine arts and continuous practice-testing, scientific-methodical work, regular reading of literature;
-integration of fine arts with other disciplines (history, geography, biology, technology, chemistry, etc.):

An art teacher must be a good listener, have good logical thinking, and have high reading, writing, speaking, and listening skills. In general, an art teacher is distinguished from other subject teachers by his creativity, initiative, and fairness. Because he should always be engaged in drawing, creating a work of art directly. He is in the process of creating something new every day. He makes something every day (didactic material, exhibition equipment). He is engaged in reproducing the natural fund. He works on himself to improve his pedagogical skills. [9; p. 24]. It is clear from this that the future teacher of fine arts is required not to stop searching.

The surest way to achieve the desired result is to conduct future visual arts teachers' lessons based on their own modern pedagogical technologies, didactic principles, and methodological

methods, which are relevant to the subject. Therefore, it is important for them to be able to effectively use the pedagogical technology, which is a project of the pedagogical process, which guarantees the achievement of the same goal while keeping up with the times. Pedagogical principles that can create pedagogical opportunities for easy, short, basic teaching of all subjects in the improvement of the professional-methodical training of future fine arts teachers in higher education institutions, in the preparation of students as specialists in accordance with the needs of the times (ílmíylík, consistency, systematicity, sequence, consciousness-activity, expressiveness, creativity, etc.) and the purposeful orientation of the content of the manifestation of the ability to create life images towards the proportionality of aesthetic and spiritual perception of the spirit.

Today, in the educational process of higher education institutions of our country, it is of great importance to widely introduce new pedagogical technologies and teaching methods into higher education curricula and programs, to qualitatively update the scientific and educational process, and to introduce modern organizational forms [10; 340 p]. The Russian artist and teacher S. Chistyakov, who created his own school of professional teaching of fine arts, wrote: “An artist is a person who knows nothing, he sees only what is new, not repeated, but only what he saw in life, what he understood, what other artists did not say, did not understand as he saw, did not understand as you do. "He is a person who can say things" [11; 39 p].

M. Vrubel brought flowers to the class and ordered one group of students to make an assumption, others to draw a picture for a task, and someone to draw a pattern on a carpet. Sometimes he himself drew on the blackboard and showed how many figures he could create, for example with a flower [11; 39 p]. Such historical evidence is important both as a historical-theoretical basis and as practical experience in the development of the professional and pedagogical competence of a future art teacher.

One of the important aspects of art training is the didactic principle. Its advantage in teaching is the creation of favorable pedagogical conditions and opportunities for students to achieve their goals throughout their lives, taking into account their knowledge, skills, and abilities. In this regard, historical principles undoubtedly play an important didactic role.

Conclusion

Studies show that even if a school has a highly qualified art teacher, if he or she does not organize his or her classes on the principle of an individual approach, this also indicates that students are not being well-organized in their visual activities. Because no matter how well the teacher knows his subject, his methodology, he cannot adequately develop the interest of the students in the class if he cannot distribute the tasks correctly.

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PREDICATEHOOD AND PEDAGOGICAL ANTICIPATION IN TEACHING KOREAN TO UZBEK LEARNERS

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Abstract. *This study proposes a theoretically grounded pedagogical model for teaching Korean predicatehood to Uzbek learners by integrating insights from formal syntax, semantics, aspectual theory, and discourse pragmatics. Based on a systematic synthesis of cross-linguistic research on Korean predicates, stative and eventive structures, complex predicates, secondary predication, and anticipation strategies, the article identifies critical theoretical, methodological, and contextual gaps in existing researches most notably the absence of pedagogically operationalized theory for Korean as a foreign language (KFL) in the Central Asian context. To address this gap, the study advances a contrastive, theory-driven methodology that reconceptualizes predicatehood as a cognitively anticipatory process rather than a purely structural unit. The proposed framework is then theoretically implemented for Korean language instruction in Uzbekistan, illustrating how predicate-centered anticipation can scaffold both comprehension and production for Uzbek learners. The study contributes to the integration of linguistic theory and pedagogy while offering a context-sensitive methodological model for KFL education.*

Keywords: *predicatehood, Korean as a Foreign Language (KFL), Predicate Anticipation, Complex Predicates, Aspect and Predication; Uzbek Learners, Theory-Driven Pedagogy.*

Introduction. Predicatehood constitutes a core organizing principle of Korean grammar, governing clause structure, aspectual interpretation, argument realization, and discourse progression (Kim, 2008; Sells, 1998). Unlike many Indo-European languages, Korean exhibits a predicate-final (SOV) architecture in which semantic, aspectual, and pragmatic information converges at the clause end. This structural property places a high cognitive load on language users, particularly second-language learners whose native languages employ different strategies for information packaging.

For Korean learners in Uzbekistan, predicatehood presents a dual challenge. On the one hand, Uzbek is also an SOV language, which superficially suggests structural compatibility. On the other hand, the internal composition of Korean predicates encompassing verbal complexes, light verbs, aspectual auxiliaries, stative/eventive alternations, and secondary predication—differs substantially from Uzbek predicate structures. Existing linguistic studies have examined these phenomena in depth, yet they overwhelmingly remain within descriptive or theoretical domains, offering limited guidance for pedagogical implementation.

This article argues that the central difficulty does not lie merely in structural differences but in the absence of a pedagogical model that treats Korean predicatehood as a process of anticipation, despite growing evidence from predicate-anticipation research (Ko, 2024). Building on linguistic research that highlights the predictive role of predicates in interpretation and processing, the study proposes a theoretically informed methodology that foregrounds predicate anticipation as a teachable cognitive strategy.

Theoretical Background and Review of Literature. Research in Uzbek linguistics and foreign language pedagogy has emphasized the central role of the predicate (*kesim*) in sentence interpretation and grammatical completeness (Abdurahmonov, 2012; Hojiyev, 2008). Studies on Uzbek syntax underscore that tense, modality, and predicative meaning are concentrated in the verbal nucleus, a property that aligns it with Korean typologically while differing in morphological realization. In the field of foreign language education in Uzbekistan, scholars have repeatedly noted that learners face difficulty not at the level of word order but at the levels of predicate interpretation, aspectual nuance, and functional morphology (Rahmatov, 2019; Khushiyeva, 2020). These observations support the relevance of a predicate-centered pedagogical approach for Uzbek learners of Korean.

A substantial body of research has demonstrated that Korean predicate categories diverge from traditional adjective–verb distinctions. Analyses arguing that Korean lacks a distinct adjective class and instead treats adjectival meanings as stative verbs underscore the predicate-centered nature of Korean grammar. These findings highlight that tense, aspect, and modality are encoded uniformly within predicate morphology, reinforcing the predicate as the locus of propositional meaning (Kim, 2008).

Studies on the Korean aspect reveal that predicates conventionally classified as stative in other languages often behave as inchoative or eventive structures in Korean (Lee, 1999; Lee, 2006). The compatibility of stative predicates with progressive morphology illustrates that Korean predicates encode internal temporal transitions. This insight is crucial for pedagogy, as it suggests that learners must be trained to interpret predicates dynamically rather than categorically.

Research on complex predicates and secondary predication in Korean demonstrates that predicate meaning is frequently distributed across multiple verbal elements (Sells, 1998; Shibagaki, 2011). Light verbs, auxiliaries, and complementizers jointly construct aspectual and pragmatic interpretations. Comparative studies show that Korean differs from related languages in allowing full clausal structures within resultatives and depictives, further complicating predicate processing for learners.

Research on metalinguistic judgment and predicate interpretation further suggests that predicate-centered structures encode speaker perspective and evaluative stance, which learners must interpret at the clause-final position (Giannakidou & Yoon, 2011). Psycholinguistic and discourse-based studies emphasize that in verb-final languages, successful comprehension depends on the ability to anticipate predicate information (Ko, 2024). Anticipation has been shown to reduce cognitive load and facilitate real-time interpretation (Ko, 2024). However, this insight has primarily been applied to interpretation studies rather than language teaching.

Identification of Research Gaps. Despite extensive theoretical coverage, three major gaps emerge from the literature. First, there is a theoretical gap: predicatehood has been analyzed structurally and semantically, but rarely reconceptualized as a cognitive process relevant to learning. Second, a methodological gap persists: most studies rely on descriptive or experimental methods without proposing pedagogically actionable frameworks. Third, a contextual gap is evident: Korean predicatehood has not been systematically examined in relation to Uzbek learners, whose linguistic background offers both opportunities and challenges for transfer. These gaps motivate the present study’s aim to integrate linguistic theory with pedagogical modeling.

Methodological Framework. The study adopts a qualitative, theory-driven research design grounded in contrastive analysis and pedagogical modeling. Rather than collecting new

empirical data, it synthesizes existing linguistic findings and reinterprets them through a pedagogical lens.

The methodology combines:

1) Contrastive linguistic analysis (Korean–Uzbek)
2) Aspectual and predicate-structure analysis
3) Cognitive anticipation theory
4) Pedagogical grammar modeling

This integrative framework allows for the transformation of abstract linguistic concepts into teachable units. Compared to experimental or corpus-based approaches, the proposed methodology is particularly suitable for under-researched educational contexts. It enables theoretical innovation without requiring large-scale data collection and provides a foundation for future empirical validation.

Pedagogical Implementation of the Theoretical Model. The proposed model shifts instructional focus from sentence-initial elements to predicate construction. Learners are guided to anticipate the meaning of the predicate based on the argument structure, adverbial cues, and discourse context.

Instructional Stages and Sequencing:

1) Awareness Stage: Introducing predicatehood as the core of Korean sentences.
2) Prediction Stage: Training learners to predict predicate type (stative, eventive, complex).
3) Construction Stage: Building predicates incrementally with auxiliaries and modifiers.
4) Integration Stage: Applying predicate anticipation in comprehension and production tasks.

Uzbek learners' familiarity with verb-final structure is leveraged, while explicit attention is paid to differences in aspectual marking and complex predicate formation.

Discussion and Implications. The theoretical implementation demonstrates that predicate anticipation can function as a unifying pedagogical principle, bridging formal linguistic theory and classroom practice. By reconceptualizing predicatehood as a dynamic process, the model addresses persistent learner difficulties and aligns with cognitive processing mechanisms identified in anticipation-based studies (Ko, 2024).

Conclusion and Directions for Future Research. This study advances a novel approach to teaching Korean predicatehood by integrating linguistic theory, cognitive anticipation, and pedagogical modeling. Focusing on the Uzbek learning context, it highlights the importance of context-sensitive, theory-driven methodologies in KFL education. The proposed framework not only fills a significant research gap but also opens avenues for future empirical and instructional research.

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A MODEL FOR DEVELOPING THE PROFESSIONAL AND PEDAGOGICAL COMPETENCE OF FUTURE TEACHERS BASED ON THE INTEGRATION OF DIDACTIC DRAMA AND MUSIC

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Abstract. *This article substantiates a model for developing the professional and pedagogical mastery of future teachers based on the integration of didactic drama and music. The study analyzes the theoretical foundations of professional–pedagogical mastery formation and reveals the reflexive-impact potential of dramatic and musical activities in the educational process. The proposed model comprises target, content, procedural, and outcome components and is aimed at fostering empathy, emotional intelligence, pedagogical reflection, communicative culture, and creative thinking among students. The findings demonstrate the effectiveness of art-based integrative approaches in enhancing the quality of teacher education.*

Keywords: *professional and pedagogical mastery, didactic drama, music integration, reflexive-impact approach, future teachers, emotional intelligence, pedagogical reflection, creative competence.*

INTRODUCTION

The modern pedagogical education system requires future teachers to possess a high level of professional and pedagogical competence, creativity, reflective thinking, and emotional intelligence. Traditional teaching methods do not always ensure the comprehensive development of these qualities. Therefore, the introduction of art-based innovative approaches into the educational process, particularly the integration of didactic drama and music, has become increasingly relevant. This article substantiates a pedagogical model based on the integration of didactic drama and music aimed at developing the professional and pedagogical competence of future teachers.

Today, the concept of integration is widely used and examined from various perspectives. Derived from the Latin words *"integrare"* (to restore) and *"ratio"* (to complete or make whole), integration refers to the process of unifying different elements into a coherent whole and restoring unity among components. In this regard, integration in education represents the meaningful combination of diverse pedagogical elements to achieve holistic and effective learning outcomes.

Music Integration in Pedagogical Education

Music integration is a didactic approach aimed at enhancing the effectiveness of education through the harmonious incorporation of musical activity elements—such as listening, rhythm, improvisation, and musical imagery—into the content of pedagogical disciplines. This approach is grounded in constructivist, reflective-affective, and arts-based education theories.

In the pedagogical process, music integration:

- optimizes the emotional learning environment;

- facilitates deeper comprehension and assimilation of educational material;
- enhances personal experience and professional reflection.

Within pedagogical education, music integration yields effective outcomes in the following areas:

- **Emotional–intellectual development:** music fosters empathy, emotional sensitivity, and self-awareness among students.
- **Reflective thinking:** analysis and discussions based on musical works strengthen students' critical reflection on their own professional activities.
- **Creative competence:** musical improvisation and rhythmic exercises activate creative thinking.
- **Communicative culture:** musical activities promote collaborative interaction and the development of communication skills.

Integration of Music and Didactic Drama in the Educational Process

When music integration is combined with didactic drama, the reflective–affective impact of the educational process is significantly enhanced. Music serves to reveal the inner meaning of dramatic situations, bring characters to life, and enrich the theatrical process emotionally. Through such integration:

- pedagogical situations are perceived more deeply;
- the effectiveness of role-playing and dramatization activities increases;
- students gain the opportunity to experience and internalize their professional roles.

In an educational process organized on the basis of integrating didactic drama and music, pedagogical situations are understood by students in a deeper and more meaningful way. Through dramatic enactment and musical expressive means, pedagogical situations are comprehended not only at the cognitive level but also at the emotional level. This enables students to holistically understand the inner essence of real pedagogical situations, intersubjective relationships, and the consequences of pedagogical decisions.

The Impact of Music and Didactic Drama Integration on Pedagogical Situational Understanding

Deep comprehension of pedagogical situations fosters the development of empathy, pedagogical sensitivity, and reflective thinking among students. The creation of an emotional atmosphere through music enhances the expressive impact of dramatic situations and contributes to the formation of students' professional positions. In instructional sessions organized on the basis of integrating didactic drama and music, the effectiveness of role-playing and dramatization activities increases significantly. Musical backgrounds and rhythmic elements intensify the emotional expressiveness of the dramatic process, enabling students to immerse themselves more deeply in their roles. This allows pedagogical situations to be presented in a vivid, natural, and credible manner. During role-playing activities, students acquire professional behavioral patterns through the enactment of pedagogical roles based on practical experience. The enhanced effectiveness of dramatization contributes to the development of students' speech culture, communication skills, empathy, and pedagogical tact.

Professional Role Awareness through the Integration of Didactic Drama and Music

In an educational process organized on the basis of integrating didactic drama and music, students gain the opportunity to experience their future professional roles within the context of real pedagogical situations. Through role-playing, dramatization, and musical expressive means, students begin to comprehend the content, responsibility, and emotional dimensions of

pedagogical activity through direct experiential learning. This process enhances professional identification and self-awareness.

Experiencing professional roles fosters pedagogical responsibility, a conscious attitude toward the teaching profession, and professional motivation among students. The emotional environment created through music increases the impact of dramatic processes and actively engages students in the process of pedagogical decision-making. The effective implementation of music integration depends on the following pedagogical conditions:

- creating a creative and psychologically supportive learning environment;
- selecting musical material in a purposeful and systematic manner;
- organizing reflective analysis and discussion on a regular basis;
- ensuring the teacher's role as a facilitator and guide in the learning process.

Creating a Creative and Psychologically Supportive Learning Environment

Creating a creative and psychologically supportive learning environment is one of the key pedagogical conditions for developing the professional and pedagogical competence of future teachers. Such an environment ensures students' freedom of thought, open expression of ideas, manifestation of emotional states, and active participation in creative activities. A psychologically supportive atmosphere fosters relationships based on trust, mutual respect, and collaboration, thereby enhancing learners' intrinsic motivation. The teacher's role as a facilitator is of particular importance in organizing a creative learning environment. The teacher should support students' initiatives and organize activities while taking into account their individual capabilities. Under the conditions of integrating didactic drama and music, such an environment is created through dramatic exercises, musical improvisations, and collaborative creative tasks. This process contributes to the development of qualities such as fearlessness of making mistakes, free self-expression, and readiness for reflective analysis among students.

Purposeful Selection of Musical Material and the Role of Reflective Analysis

The purposeful and systematic selection of musical material in the educational process is one of the key pedagogical conditions determining the effectiveness of integrating didactic drama and music. Musical works should be selected in accordance with educational objectives, lesson content, and the psychological characteristics of students. In this process, attention should be paid to the emotional expressiveness of music, its rhythmic structure, genre characteristics, and the level of imagery. When selecting musical material, its relevance to pedagogical situations, its capacity to support dramatic enactment, and its potential to activate reflective analysis are considered important criteria. The gradual increase in the complexity of musical material contributes to the consistent development of students' emotional perception and creative activity. Moreover, the balanced use of national and world music examples fosters the development of students' aesthetic taste and cultural thinking.

The regular organization of reflective analysis and discussion is a significant pedagogical condition for developing the professional and pedagogical competence of future teachers. In instructional sessions based on the integration of didactic drama and music, reflection enables students to comprehend their own activities, deeply analyze pedagogical situations, and evaluate personal and professional experience. This process promotes the development of critical thinking, self-assessment, and professional responsibility. Reflective discussions can be organized at the final stage of a lesson through dialogue, open-ended questions, written reflection, group analysis, and debates. Reflective analysis conducted after musical and dramatic activities helps students understand their emotional states, interpret theatrical experience in pedagogical terms, and clarify

their professional positions. Through systematic reflection, students develop a conscious and responsible attitude toward pedagogical practice.

The Teacher's Role as Facilitator and Guide in the Integration of Didactic Drama and Music

In an educational process organized on the basis of integrating didactic drama and music, the teacher's role as a facilitator and guide is of particular importance. This role implies that the teacher acts not merely as a transmitter of knowledge, but as a subject who supports students' independent thinking, creative activity, and reflective analysis. A facilitator teacher creates a psychologically supportive learning environment, encourages students' initiatives, and ensures their active participation in the educational process. The guiding role is expressed in the teacher's purposeful organization of dramatic and musical activities and in directing the learning process toward pedagogical objectives. Rather than providing ready-made solutions, the teacher encourages students to make independent decisions through problem-based situations. At the same time, during reflective discussions, the teacher synthesizes students' ideas and guides them toward drawing professional and pedagogical conclusions.

Conclusion

In conclusion, music integration serves as an effective didactic tool for developing the professional and pedagogical competence of future teachers within pedagogical education. This approach enhances learners' emotional, reflective, and creative potential, thereby improving the quality and effectiveness of the educational process. Therefore, the widespread implementation of music integration–based methods in pedagogical education practice is both scientifically and practically relevant.

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PHILOSOPHICAL AND PSYCHOLOGICAL ROOTS OF THE NARRATIVE APPROACH

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Abstract. *This article examines the philosophical and psychological foundations of the narrative approach as a contemporary paradigm in the human and social sciences. The study analyzes narrative as a means of understanding human experience, identity formation, and emotional meaning-making. Particular attention is paid to the influence of existential philosophy, phenomenology, and hermeneutics on the development of narrative thinking, as well as to the role of narrative approaches in modern psychology and education. The article highlights the significance of narrative methods in understanding emotional intelligence and professional development.*

Keywords: *narrative approach, narrative thinking, identity, emotional experience, reflection, emotional intelligence.*

Introduction

In modern social and human sciences, there is a growing tendency to understand the individual not only through objective behavior or cognitive processes, but also through life experience, emotional states, and personal stories. From this perspective, the narrative approach has emerged as an important methodological paradigm that interprets human life as a meaningful sequence of events. The narrative approach serves as a significant theoretical framework for understanding an individual's inner world, emotional experience, and identity.

The philosophical foundations of the narrative approach are primarily associated with existential philosophy. Thinkers such as Søren Kierkegaard, Martin Heidegger, and Jean-Paul Sartre viewed human life not as a predetermined essence, but as a phenomenon created by the individual through processes of meaning-making. Human beings understand their lives through chains of events and assign meaning to these experiences.

Phenomenology, developed by Edmund Husserl, represents another important philosophical source of the narrative approach. In phenomenology, human experience is explained through subjective perception and lived experience. Similarly, the narrative approach seeks to reveal personal experience in the form of stories, emphasizing the individual's subjective interpretation of reality.

In addition, hermeneutics (H.-G. Gadamer, P. Ricoeur) constitutes the methodological foundation of the narrative approach. Paul Ricoeur interpreted narrative as a mechanism that connects time, memory, and identity, and introduced the concept of *narrative identity* into academic discourse. According to Ricoeur, individuals understand themselves through storytelling and construct their sense of self ("I") through narrative.

In psychology, the narrative approach developed in the second half of the twentieth century. In particular, **humanistic psychology** (A. Maslow, C. Rogers) placed the individual's inner world and subjective experience at the center of analysis. This orientation created a favorable psychological foundation for the emergence and development of the narrative approach.

Jerome Bruner conceptualized narrative thinking as one of the fundamental modes of human cognition. According to him, people understand the world not primarily through logical-scientific reasoning, but through stories. Narrative thinking enables individuals to express emotional experience, values, and social relationships in an integrated and meaningful form.

The **life story theory** developed by **Dan P. McAdams** is considered one of the most significant models of the narrative approach in personality psychology. According to this theory, individuals construct their lives as narratives, and these narratives influence their identity, emotional states, and professional self-understanding.

In recent years, the concept of **professional-emotional intelligence** has become a subject of extensive discussion in education and upbringing processes. Professional-emotional intelligence can be defined as a set of abilities that enable an individual, within the context of professional and pedagogical activity, to recognize and understand their own emotions and those of others, to regulate them effectively, and to apply them constructively in interpersonal relationships.

The concept of **professional-emotional intelligence** was introduced into academic discourse in the late twentieth century. In 1990, **P. Salovey and J. Mayer** defined emotional intelligence as *"a form of social intelligence that involves the ability to monitor one's own and others' emotions, to discriminate among them, and to use this information to guide one's thinking and actions."* Subsequently, **D. Goleman** and other scholars popularized the concept of professional-emotional intelligence, emphasizing that it can be an even more important factor for personal and professional success than intellectual ability (IQ).

According to **Goleman's model**, professional-emotional intelligence consists of several core components.

1. Self-awareness

Self-awareness is a complex cognitive-emotional process that occupies a central place in an individual's psychological development. It is characterized by a person's ability to accurately perceive their current emotional states, understand the causes of these emotions, and consciously evaluate their influence on behavior and decision-making. This process represents one of the key components of the professional-emotional intelligence system and plays a significant role in professional activity, everyday life, and interpersonal communication.

An individual with a well-developed capacity for self-awareness is able to realistically assess their strengths and weaknesses, observe their professional-emotional reactions, and work with them consciously. The ability to analyze one's own emotions begins with recognizing the physiological and cognitive indicators of emotional processes. These include changes in heart rate, irregularities in breathing, feelings of nervousness, excitement, or depression. A person who can correctly interpret these signals is able to clearly identify their emotional state.

Conversely, the inability to accurately recognize one's emotions often leads to irrational behavior, impulsive decision-making, communication difficulties, and challenges in managing psychological stress.

Self-awareness also plays an invaluable role in the decision-making process. Understanding the influence of emotional states on decisions enables individuals to analyze situations more effectively, distance themselves from subjective factors, and make more objective choices. When a person recognizes that they are experiencing a depressed mood, they may decide to postpone important decisions or seek additional information before making them. Similarly, an overly excited individual, aware of the increased risk of impulsive decisions, may deliberately

apply self-calming strategies. A high level of self-awareness is an indicator of psychological maturity. Such individuals tend to appear stable, balanced, and reliable in social relationships. Because they are capable of managing their emotions in social situations, they act more effectively in conflicts, uncomfortable interactions, and situations that require complex decision-making.

2. Self-regulation

Self-regulation refers to a complex set of competencies that are of critical importance in the process of psychological development. The ability to self-regulate is characterized by an individual's capacity to control internal experiences, emotional states, and affective reactions. At the core of this ability lies the individual's conscious response to negative emotions, as well as the regulation of affective reactions such as anger, irritability, fear, anxiety, and tension.

The development of self-regulation is influenced by multiple factors, including age-related psychological characteristics, social skills acquired through upbringing, emotional experiences, family environment, learning activities shaped within the education system, and interactions with social groups. One of the key components of self-regulation is the skill of **self-soothing**. Self-soothing enables individuals to stabilize their emotional state in stressful situations, reduce emotional strain, and restore cognitive balance that allows for accurate evaluation of circumstances.

This process reflects a high level of psychological control mechanisms. When individuals are able to calm themselves, they assess situations not through irrational reactions but through logically grounded thinking. As a result, they are better equipped to address stressful situations in a constructive and adaptive manner.

Another component directly related to **self-regulation** is **goal orientation**. Goal orientation refers to an individual's ability to consistently accomplish assigned tasks, demonstrate perseverance in their implementation, and continue purposeful activity despite failures or difficulties. This characteristic requires a process of **self-motivation**. Self-motivation is associated with an individual's internal needs, values, and ideals; through this process, a person encourages themselves, consciously regulates their activity, and assumes responsibility for outcomes.

An individual's capacity for **social awareness or empathy** is considered one of the core components of the professional-emotional intelligence system. Empathy is the ability to sense others' emotions, understand their psychological states, and resonate with them emotionally. Empathy involves not only perceiving others' feelings, but also the ability to place oneself in another person's position, imagine their inner experiences, and consciously comprehend their needs, moods, and thoughts. Students with a high level of social awareness are able to accurately interpret nonverbal cues during interpersonal communication. They correctly decode emotional signals conveyed through facial expressions, body movements, tone of voice, and pauses in interaction. Empathy serves as a crucial psychological mechanism that enhances the effectiveness of social relationships. Empathic individuals work more productively in teams and establish positive social connections through cooperative interaction.

3. Social awareness

Social awareness also encompasses the concept of **social consciousness**. Social consciousness refers to the ability to perceive and understand others' needs, moods, attitudes, the dynamics of interpersonal relationships, and psychological processes within groups. It requires individuals to perceive the social environment deeply and comprehensively, analyze social situations logically, and identify the motives underlying others' behavior. This process represents an important factor of social adaptability and manifests itself in the functioning of social

institutions, group psychology, and leadership processes. Empathy and social awareness create broad opportunities for the healthy development of social relationships. Individuals possessing these qualities easily establish rapport with others, contribute to a positive psychological climate within groups, and play a significant role in preventing conflicts. Therefore, the development of empathy is considered one of the key directions of psychological education and upbringing.

4. Relationship management

Relationship management competence encompasses a set of psychological skills that determine an individual's ability to function effectively in a social environment. This competence is characterized by the ability to engage in constructive communication, collaborate within teams, demonstrate leadership qualities, and resolve disagreements rationally. Relationship management requires communicative competence, emotional control, social-perceptive skills, and awareness of conflict dynamics.

One of the most important aspects of relationship management is the ability to **manage conflicts**. Conflict management is defined by an individual's capacity to analyze situations, identify the causes of disagreements, propose solutions acceptable to all parties, and resolve problems constructively. This process demands a high level of professional-emotional culture, patience in communication, skills of compromise, and a well-developed listening culture.

Conclusion

The philosophical and psychological roots of the narrative approach determine its significance in contemporary education and psychological science. While existentialism, phenomenology and hermeneutics constitute the philosophical foundations of the narrative approach, humanistic and personality psychology provide its psychological basis. The narrative approach offers substantial methodological opportunities for understanding emotional experience, shaping identity, and developing professional-emotional intelligence.

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TECHNOLOGIES FOR FORMING HEALTHY LIFESTYLE SKILLS

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Abstract. *The article examines the importance and effectiveness of pedagogical technologies in shaping a healthy lifestyle among students majoring in physical education. In the modern educational process, the development of a healthy lifestyle not only strengthens students' health but also contributes to increasing their intellectual and social activity.*

Keywords: *physical education, healthy lifestyle, pedagogical technology, student, health, anthropometry.*

Introduction

In the modern information society, it is necessary to provide many conditions for maintaining people's health and quality of life, among which general and medical literacy are of great importance. By creating pedagogical conditions for students to understand the importance of health in the context of modern global problems and forming a healthy lifestyle in them, we can also achieve an increase in health and medical culture among the population. Innovative approaches to developing healthy lifestyle skills in future physical culture specialists include the use of health protection and information and communication technologies, game and competition methodologies, level differentiation, as well as interdisciplinary integration and project-oriented training. This serves to train competitive specialists who are able to form a healthy lifestyle in themselves and others using modern methods and taking into account individual needs. It is worth noting that the more educated a person is, the more responsibly he approaches his health. The foundations of valeological knowledge should be formed in the family, and systematized and improved in educational institutions of all levels. Based on this, the role of educators in shaping the health of the future generation is of particular importance.

Modern science defines human health as consisting of the following components: functional-structural – the ability of all systems and organs of the body to function normally, their mutual harmony; physico-chemical – aspects of body structure, metabolism, immunity and biological processes that determine the level of health; psycho-emotional – psychological stability, emotional state and stress tolerance; spiritual – the moral, cultural and social health of a person, harmony with life values. Thus, health is a complex and multifaceted concept that combines the physical, mental and spiritual aspects of a person.

The international organization UNESCO divides the concept of health into three components: physical health (somatic), mental health and spiritual health. It can be seen from this that health is a sufficiently deep and multifaceted concept that, with its complexity, not only analyzes different levels of the human structure, but also expresses its individual uniqueness. By creating pedagogical conditions for students to understand the importance of health in the context of modern global problems and to form a healthy lifestyle in them, we can also achieve an increase in health and medical culture among the population. Innovative approaches to the development of

healthy lifestyle skills in future physical education specialists include the use of health protection and information and communication technologies, game and competition methodologies, level differentiation, as well as interdisciplinary integration and project-oriented teaching. This serves to train competitive specialists who, using modern methods and taking into account individual needs, are able to form a healthy lifestyle in themselves and others. It is worth noting that the more educated a person is, the more responsibly he approaches his health.

The foundations of valeological knowledge should be formed from the family, and systematized and improved in the conditions of educational institutions of all levels. Based on this, the role of educators in shaping the health of the future generation is of particular importance. Although the main task of higher educational institutions is to form the competence of maintaining a healthy lifestyle in future physical education teachers, the theoretical foundations and practical mechanisms of this process have not been sufficiently developed. Solving this problem requires the development of theoretical foundations for the formation of the competence of maintaining a healthy lifestyle, that is, medical and scientific literacy, in students of the physical education department of pedagogical universities, the creation of its model, and the identification of conditions ensuring its effective implementation.

In the conditions of the constantly changing economic situation in modern society, the issue of strengthening and preserving the health of students and youth traditionally remains one of the most important issues and requires a new approach to its solution. It is necessary to develop effective preventive measures, form a stable motivation in students for a healthy lifestyle, and develop the need for physical and psychological self-improvement. The future physical education teacher must be able to effectively use modern pedagogical technologies, innovative methods and health-improving programs in his work. This will have a positive effect not only on the physical development of students, but also on their spiritual and mental state, and on their willpower. Also, such a teacher, by his personal example, will show the importance of a healthy lifestyle, instill in students a sense of responsibility for their own health and the desire for a healthy life. The essence and structure of the concept of "Healthy lifestyle - competence" of a future specialist is that healthy lifestyle - competence is not just having knowledge about health, but the ability of a future physical culture specialist to maintain his own health, design a healthy lifestyle and teach these skills to others at a professional level.

The relevance of forming healthy lifestyle skills in future specialists is not only to achieve sports results, but also to improve the culture of health in society and create a mechanism for raising a mentally and physically healthy generation. Physical culture and sports, as an integral part of socio-economic development, have many directions and goals. The lifestyle of any person covers many aspects. These two concepts affect the process of self-awareness and self-improvement, the formation of will. Recently, the influence of physical culture and sports on the development of the student's personality has been steadily increasing. A healthy lifestyle is a controlled process that should take into account the interests, motivations, level of physical fitness of students and the capabilities of the higher educational institution.

Properly organized active physical culture and sports promotion plays a major role in successfully solving these issues. This includes increasing the level of knowledge of students in the field of physical education, educating the need to adopt a healthy lifestyle, using physical culture tools in the work and leisure regime, activating extracurricular forms of physical education and health work among students, involving all members of the team in participation in mass health, physical education and sports events,It is extremely necessary to increase the effectiveness of

physical education classes and physical education and health-improving activities, and to improve mass physical education work among students.

In the modern higher education system, the formation of a healthy lifestyle in students is an important pedagogical task. This process is effectively carried out not only through physical education classes, but also through the use of interactive, innovative pedagogical technologies. Physical culture also has such a function that it is the transfer of experience in creating modern technologies and using means of regulating the psychophysical state of people; this forms the basis for the development of health technologies. If physical culture is a means of increasing labor productivity and achieving high results in professional activity, then professional activity, in turn, provides appropriate conditions (material and spiritual) for the development of physical culture. A healthy lifestyle is an indicator of how a person uses the living conditions in the environment for his health. Components (components) of a healthy lifestyle: physical activity, exercise, rational nutrition, adherence to the daily routine, personal hygiene, rejection of harmful habits. An important component of a healthy lifestyle of young people is playing sports. A specialist's healthy lifestyle competence is manifested through the following three interrelated components:

1. Structural structure of competence

- Cognitive component: Deep theoretical knowledge of human physiology, hygiene, proper nutrition, distribution of physical loads and the consequences of harmful habits.
- Motivational-value component: Recognition of health as the highest vital and professional value, an internal need to constantly work on oneself.
- Active component: The ability to apply theoretical knowledge in practice, regularly engage in sports, form stress resistance skills and develop health programs.

2. Assessment criteria and indicators The following criteria are used to determine the STT-competence of students: Level of knowledge. Perfection of medical-biological and pedagogical knowledge, understanding of the methodology of a healthy lifestyle. Motivation. The will to be healthy, interest in sports, striving for professional success. Personal example. The student's appearance (anthropometry), freedom from harmful habits, level of physical fitness. Methodical skills. The ability to explain the rules of a healthy lifestyle to others and conduct promotional work. The formation of students' health through pedagogical means depends on the efforts of teachers of all specialties, the entire teaching staff; also, the higher the health culture of all participants in the educational process, the more effective health care activities will be.

However, today the main problem is that a healthy lifestyle is not given priority in society, and the role of health in the educational space is not sufficiently understood. This has aroused great interest in various aspects of physical culture and requires its detailed study. Pedagogical technologies are systematic methods of planning, monitoring and evaluating the educational process, through which student motivation increases, knowledge and skills are strengthened. In the application of pedagogical technology for the formation of a healthy lifestyle in students in the direction of physical culture, physical education tools, non-traditional methods and assessment of the physical development of adolescents, as well as interactive classes, play an important role. This process is aimed at developing their physical qualities and requires the application of the scientific foundations of physical culture, modern pedagogical approaches (for example, differentiation, design, interactive games, person-oriented approaches). The following methods are considered effective in the direction of physical culture:

1. Active learning methods - for example, group classes, sports games, innovative trainings encourage students to actively participate.

2. Individual approach - adapting classes to each student's physical condition and abilities.

3. Information and communication technologies - making the process interesting through online lessons, electronic monitoring, and mobile applications that promote a healthy lifestyle.

4. Through the use of pedagogical technologies, students gain skills to improve their health, effectively manage time, and increase social activity.

The formation of healthy lifestyle components was defined as a set of the following:

- A valuable attitude towards health and a healthy lifestyle;
- The degree of students' mastery of methods and means of maintaining and strengthening personal health.
- The ability to set the goals of their own personal healthy lifestyle program. The ability to set the goals of their own personal healthy lifestyle program.

1. Purposefulness. Setting clear (SMART) health goals.
2. Consistency. Systematic, not one-time, training and healthy habits.
3. Scientificity. Relying on medical and physical education rules when creating a program.
4. Effectiveness. Recording achievements (for example, reducing shortness of breath).

The ability to set the goals of a personal healthy lifestyle program is the highest stage of a student's transition from passive maintenance of their health to active and strategic management of it. Such an approach, based on the principles of purposefulness, consistency, scientificity and effectiveness, establishes valeological competence, which allows a person to model and optimize his physical and mental capabilities throughout his life. The formation of a healthy lifestyle for students in the direction of physical culture is effectively carried out using pedagogical technologies. This not only improves their physical health, but also contributes to their intellectual and social development. Therefore, the widespread use of pedagogical technologies in higher educational institutions is recommended. Based on research and analysis, the following final conclusions were drawn: Specialist - social role model: Future specialists must be formed as "health ambassadors" who not only teach sports skills, but also set a personal example for society in terms of physical activity, proper nutrition and abstinence from harmful habits. Comprehensive and systematic approach: The process of forming STT should combine theory, practice and modern pedagogical technologies (for example, asymmetric gymnastics, SMART goals). This process should be seen as a single mechanism that ensures both the physical and intellectual-spiritual development of the student.

Controlled and motivational process: The formation of STT in higher education institutions is a clearly controlled process that takes into account the student's personal interests and motivation. This process turns the student from a passive participant into an active subject who projects his own health. Promotion and publicity: The use of creative and effective promotional methods and the involvement of the entire academic community in extracurricular sports events are of great importance in promoting the culture of STT.

The use of technologies for the formation of a healthy lifestyle allows the development of such basic characteristics of the student's personality as a tendency to cognition and self-awareness, high-level needs and value relationships. In addition, these technologies serve to reassess the meaning of their life activities, to achieve success, to be recognized, to realize their abilities, including the need to change their lifestyle. Diagnostics, in turn, allows you to increase motivation for physical education classes and forms a healthy lifestyle in students. In conclusion,

the formation of healthy lifestyle competencies in future physical education specialists is of paramount importance.

After all, they should be role models and promoters of a healthy lifestyle that affects the health of society and the formation of a comprehensively developed personality through physical activity, proper nutrition, giving up bad habits and stress management. This requires a comprehensive approach to education, combining theory, practice and personal example. The formation of healthy lifestyle competencies in future physical culture specialists is not just an educational task, but a strategic necessity aimed at preserving the gene pool of society. By forming healthy lifestyle skills, we will not only achieve sporting achievements, but also create a system for educating a strong-willed and comprehensively developed generation that feels responsible for its own health.

Conclusion

Based on the holistic concept of health, teaching a healthy lifestyle includes not only physical self-improvement, mastering methods of maintaining and strengthening health, but also the formation of the motivational and spiritual sphere of health: a value-based approach to health, the need for self-awareness and improvement. The formation of healthy lifestyle competencies in future physical culture specialists is not just an educational task, but a strategic necessity aimed at preserving the gene pool of society. By forming healthy lifestyle skills, we will not only achieve sporting achievements, but also create a system for raising a strong-willed and comprehensively developed generation that feels responsible for its own health.

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DEVELOPING STUDENTS' TECHNICAL CREATIVITY THROUGH TEACHING THE "MAGNETIC FIELD" TOPIC USING PEDAGOGICAL SOFTWARE TOOLS

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Abstract. *This article presents the scientific and methodological foundations of using modern pedagogical and digital technologies for teaching physics in general secondary schools, particularly the "Magnetic Field" unit. The study places special emphasis on ensuring interdisciplinary integration, harmonizing students' theoretical knowledge with practical activities, and developing their algorithmic, critical, and creative thinking skills. The article analyzes the types of pedagogical software tools, their didactic capabilities, and their role in the educational process, substantiating the advantages of modeling, demonstration, training, and assessment programs. In addition, a safe instructional demonstration project titled "Captive Solenoid Demo" is proposed for studying electromagnetic induction and magnetic field phenomena. The operating principle of the device, its technical parameters, and safety requirements are described in detail. Through this project, the processes of converting electrical energy into magnetic and mechanical energy are demonstrated in a visual and comprehensible manner. The research results are significant in that they enhance students' interest in physics, encourage the development of innovative ideas, and support the acquisition of basic programming elements.*

Keywords: *physics teaching methodology, magnetic field, pedagogical software tools, interdisciplinary integration, electromagnetic induction, digital education, instructional demonstration experiment, innovative approach.*

Introduction

At the global level, considerable attention is being devoted to improving modern forms and methods of teaching natural sciences, including physics, through scientific achievements and their practical application. In this regard, there is a growing need to develop a methodological system based on modern teaching methods and tools that correspond to the content of education, aimed at developing students' interdisciplinary knowledg. This includes defining the pedagogical conditions for implementing such a system, improving the content of educational materials, and developing interactive technologies and software to facilitate their effective assimilation. Such an approach is particularly relevant, as it contributes to improving the quality of students' subject knowledge and enables the development of scientific and methodological support for the discipline.

In the general secondary education system of our country, significant attention is also paid to the development of modern didactic support for school subjects. As a result, in physics teaching-alongside other disciplines-the possibilities of instruction based on information technologies are

expanding. This makes it possible to take into account the specific characteristics of physics as a subject, simplify the teaching of complex topics through modern experimental approaches, and comprehensively demonstrate all aspects of interdisciplinary integration.

In particular, teaching the “Magnetic Field” unit [1] in physics plays a crucial role not only in shaping students’ scientific worldview within the information environment, but also in developing their digital education and information culture. In today’s “Information Age,” this approach not only enhances students’ computer literacy but also expands their opportunities to work with software tools in studying specific physical phenomena. Knowledge, skills, and competencies acquired in physics through the use of software tools significantly contribute to the creation of websites at various levels, engagement in scientific research institutions, professional orientation, and a comprehensive understanding of physical processes that cannot be directly observed.

Literature Review

Numerous studies indicate that programming contributes to the development of planning and organizational skills, mathematical abilities, and abstract thinking. According to researchers, programming also fosters such competencies in students as problem-solving, critical thinking, creative thinking, algorithmic thinking, reflective thinking, teamwork, and learning-to-learn skills. It is evident that all of these competencies are essential for individuals living in the twenty-first century.

The thinking patterns and lifestyles of modern children are strongly influenced by computers. Policymakers supported by the technology industry increasingly demand that children be taught how technology works and that a “digital society” be prepared for an increasingly IT-driven global economy [2].

Pedagogical software tools are didactic resources designed to partially or fully automate the teaching and learning process through the use of computer technologies. The structure of pedagogical software tools includes programs (or sets of programs) aimed at achieving specific didactic objectives in teaching a particular subject, a set of technical and methodological documentation, and, when necessary, additional auxiliary resources.

Research Methods

Pedagogical software tools based on elements of students’ learning activities can be classified as follows. One group consists of tools directly used by students, while the other group includes tools employed by teachers in the course of working with students [3].

The first group includes:

- modeling and research software;
- computer-based training simulators;
- computer-based assessment programs;
- information and reference systems.

The second group includes:

- modeling and demonstration software;
- programs for generating and verifying individualized assignments.

Modeling research and demonstration software simulate the functioning of various physical, biological, ecological, economic, and other systems through mathematical models. Such models contain a set of input variables and parameters that allow variations in system behavior and enable the study of the laws and principles governing its operation. The difference between research-oriented and demonstration-oriented models lies in their didactic purpose. In

demonstration activities, the primary didactic factor is the visualization and presentation of a process or phenomenon, whereas research-oriented software should be constructed according to the principles of an operational system in which students independently identify subjectively new knowledge through exploration.

During practice activities, students work under software control while independently selecting learning strategies. Similarly, the pace of learning, the volume and complexity of tasks, and the level of assistance provided are individualized.

Computer-based assessment programs are designed to monitor students' knowledge and skills at all stages of instruction. Computer-based assessment should include:

- generating tasks according to sequences defined by the teacher (or selecting them from an existing database) and presenting them to students;
- providing students with tools for task completion (on-screen calculators, text editors, interfaces for entering answers, etc.);
- qualitatively evaluating task performance and analyzing errors during formative assessment;
- statistically processing the results of group assessments.

In addition, assessment programs, like training simulators, should ensure maximum adaptability to students' individual characteristics and capabilities. For this purpose, they should include adjustable parameters accessible to teachers. The absence of such parameters (so-called "rigid" programs) limits the effective use of pedagogical software tools to some extent.

Information and reference systems integrate programs and platforms used by students as sources of factual information. These include multimedia systems and global computer networks, primarily the Internet. After receiving an assignment from the teacher, students search for the necessary information within the system and assimilate it. Naturally, such activities require that students be prepared to independently search for information and process the data obtained.

Programs for generating and verifying individualized assignments are aimed at personalizing problem-solving practice by reducing repetition and varying tasks within a single topic from school problem collections. According to the method of creating individualized tasks, such programs are classified into banks, variators, and generators. These tools are used by teachers, after which assignments may be provided to students in a non-digital (paper-based) format, similar to collections of variated tasks in computer science. Subsequent assessment may be conducted by the teacher with or without the use of computers. In addition, a wide range of instructional videos and programming guides available on the Internet can be creatively utilized to develop students' creative abilities through teaching with pedagogical software tools [4].

Description of an Electromagnetic Accelerator Device. To enable students to apply theoretical knowledge in practice and master programming skills as described above, a description of an *electromagnetic accelerator* device is presented.

The electromagnetic accelerator operates based on the laws of electromagnetic induction and the interaction between magnetic fields and matter. The primary function of the device is to convert electrical energy into strong magnetic field energy within a short period of time and to demonstrate the process by which this field exerts a mechanical effect on a ferromagnetic core.

1. **Conservation and storage of electrical energy.** At the initial stage of the device operation, the energy obtained from the power source is accumulated in capacitors. In the capacitors, energy is stored in the form of an electric field, and its amount is determined by the classical expression:

$$E=\frac{1}{2}CU^2$$

where:

C–capacitance of the capacitor,

U – voltage.

This stage makes it possible to store energy in a stable state and subsequently transfer it within a very short time interval.

2. Formation of a current impulse. When the capacitor circuit is connected to an electromagnetic coil (solenoid), the energy stored in the capacitor is converted within a short time into a strong current impulse flowing through the coil. This process is time-limited and is characterized by a rapid increase and decrease of the current. With the appearance of the current impulse, the coil exhibits inductive properties. A self-induction voltage directed against the change in current arises, which electromagnetically balances the process.

3. Formation of a magnetic field. When current flows through the coil, a magnetic field is formed around it. The magnetic induction inside the solenoid can be approximately expressed by the following relationship:

$$B\sim\mu nI$$

where:

μ–magnetic permeability of the medium,

n–number of turns of the coil per unit length,

I–current strength.

The maximum value of the magnetic field is formed in the region close to the center of the solenoid, which causes spatial nonuniformity of the force acting on the ferromagnetic core

4. Force acting on the ferromagnetic core. The ferromagnetic core placed inside the solenoid becomes magnetized under the influence of the magnetic field. Due to the presence of a magnetic field gradient, an attractive force directed toward the region of higher field strength acts on the core. The nature of this force is explained by the tendency of the magnetic energy to reach a minimum. As a result, the core moves toward the center of the solenoid. This process clearly demonstrates the conversion of electrical energy into magnetic energy and then into mechanical energy.

5.Termination of the impulse and limitation of motion. When the current impulse ends, the magnetic field rapidly decays. The core continues its motion for a short time due to inertia; however, in the demonstration device it is retained by a mechanical constraint (captive mechanism). Therefore, the core does not exit into the external environment, and the device performs only a visual and scientific demonstration function.

6.Energy dissipation and return of the system to equilibrium. After the magnetic field disappears, the excess energy in the system is dissipated in the form of heat. Reverse voltages arising in inductive elements are suppressed through special protection circuits. After that, the device returns to its initial equilibrium state and becomes ready for the next experiment. This demonstration electromagnetic accelerator device clearly and safely illustrates electromagnetic induction, the magnetic field gradient, and the processes of energy conversion from one form to another. The device serves as a convenient model for studying the practical manifestations of electromagnetic phenomena for scientific and educational purposes.

In practice, this principle is widely applied in many processes, for example, in the construction industry for driving support piles to reinforce building foundations, in stone quarries

for moving and breaking rocks, as well as for driving various protective piles and similar applications (Figure 1).



Figure 1. Pile driving process in practice

Research results. Based on students' knowledge gained from studying physics, particularly the "Magnetic Field" section [5], we recommend the following project to enhance understanding of physical processes, stimulate the development of innovative ideas, encourage inventions, and foster interest in programming these processes.

SAFE "CAPTIVE SOLENOID DEMO" FOR COMPLETE, DEMONSTRATION-LEVEL PROJECT

1. System operation algorithm

Buttons	**The task is**
BTN1 (ARM)	Charges capacitors up to 24 V
BTN2 (FIRE)	To the solenoid short impulse gives (100–200 ms)
Arduino	Limits time, ensures safety

2. A social electrical parameters (safe)

1) Voltage : 24 V DC
2) Maximum pulse time: ≤ 200 ms
3) energy : low (for demo)
4) root : captive (out (not going)

3. Necessary components (clear name and parameters)

Electronic components

Power and energy

Name	**P arameters**
DC Power Supply	24 V, 5 A
Capacitor C1	4700 µF, 35 V, Low-ESR
Capacitor C2	100 nF, 50 V (for noise)
Discharge resistor R1	10 kΩ, 2 W

Solenoid and switch

Name	**P arameters**
Solenoid	24 V DC, 2–3 A, captive type , transparent

MOSFET	IRLZ44N (logic level)

Protection

Name	P arameters
Flyback diode	1N5408 (3A)
TVS diode	SMBJ33A
Insurance	5 A automotive fuse

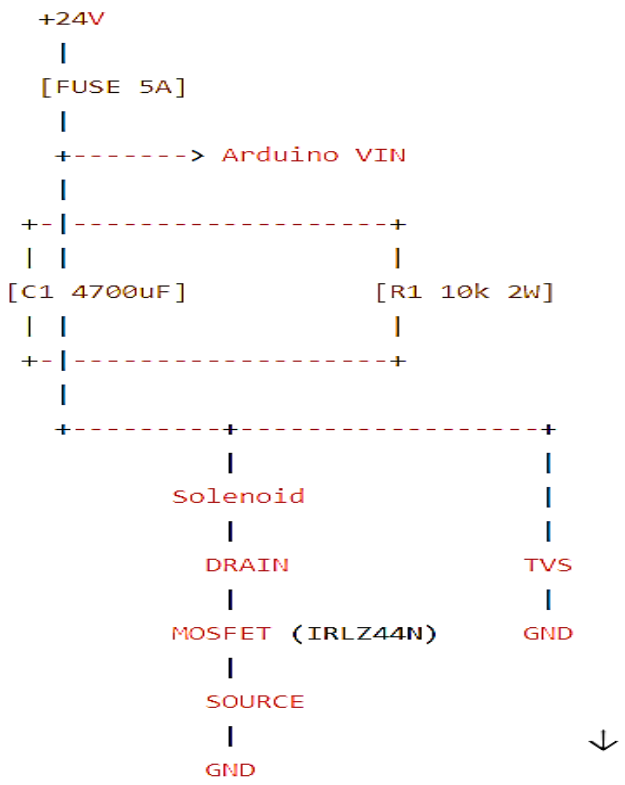
Management

Name	P arameters
Arduino	Arduino UNO or NANO
Button BTN1	NO Push Button
Button BTN2	NO Push Button
Button resistors	10 kΩ pull-down

Mechanical parts

1) s is light captive solenoid tube
2) front and back steel stop plates
3) core way along rubber shock absorber
4) protected (insulated) housing

4. Connection diagrammatic scheme - picture)



Flyback diode 1N5408:
Cathode → +24V
Anode → Solenoid drain tomoni
Arduino:
D8 → Gate (100Ω orqali)
BTN1 → D2 (ARM)
BTN2 → D3 (FIRE)

GND → umumiy GND

5. Arduino kodi (xavfsiz cheklov bilan)

```
#define ARM_BTN 2
#define FIRE_BTN 3
#define SOLENOID_PIN 8
#define FIRE_TIME 150   // ms (xavfsiz impuls)
bool armed = false;
void setup() {
pinMode(ARM_BTN, INPUT_PULLUP);
pinMode(FIRE_BTN, INPUT_PULLUP);
pinMode(SOLENOID_PIN, OUTPUT);
digitalWrite(SOLENOID_PIN, LOW);
}
void loop() {
// ARM tugmasi
if (digitalRead(ARM_BTN) == LOW) {
 armed = true;
            delay(300); // debounce
 }
// FIRE tugmasi
 if (armed && digitalRead(FIRE_BTN) == LOW) {
            digitalWrite(SOLENOID_PIN, HIGH);
            delay(FIRE_TIME);
            digitalWrite(SOLENOID_PIN, LOW);
            armed = false; // qayta arm qilish majburiy
            delay(500);
 }
}
```

6. Important Safety Notes

1. Do not open the solenoid.
2. The core must never move freely.
3. Do not touch the capacitor.
4. Wait 10–15 seconds after operation (R1 discharges the capacitor).

Conclusion

When carrying out such projects, it is emphasized that strict compliance with technical safety rules is mandatory, and before starting work, students must consult with the teacher or a qualified specialist.

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THE ROLE OF SPEAKING SKILLS IN ENGLISH LANGUAGE TEACHING AND CEFR STANDARDS

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Abstract. *Speaking is one of the core productive skills in English Language Teaching (ELT) and plays a decisive role in developing learners' communicative competence. Within the framework of the Common European Framework of Reference for Languages (CEFR), speaking is viewed not merely as the ability to produce grammatically correct utterances, but as the capacity to interact meaningfully, appropriately, and effectively in real-life communicative situations. This article examines the role of speaking skills in ELT through the lens of CEFR standards. It analyzes the theoretical foundations of speaking competence, explores CEFR descriptors related to spoken production and interaction, and discusses pedagogical implications for classroom practice. The study highlights the necessity of aligning speaking instruction with CEFR levels in order to ensure systematic development of learners' oral proficiency.*

Keywords: *speaking skills, communicative competence, CEFR, English language teaching, oral proficiency*

INTRODUCTION

Speaking skills occupy a central position in English Language Teaching (ELT), as they enable learners to actively participate in communication and express ideas effectively in real-life situations. Among the four core language skills—listening, speaking, reading, and writing—speaking is often considered the most challenging yet the most essential, since it requires the immediate and integrated use of linguistic knowledge, cognitive processing, and social interaction.

In contemporary English Language Teaching, the ultimate goal of instruction is no longer limited to grammatical accuracy but extends to the ability to communicate effectively in diverse social and academic contexts. Among the four language skills—listening, speaking, reading, and writing—speaking occupies a central position, as it directly reflects learners' ability to use language for real-time communication.

The Common European Framework of Reference for Languages (CEFR) has significantly influenced language teaching and assessment worldwide by providing a unified, transparent, and comprehensive system for describing language proficiency. Within this framework, speaking skills are systematically described across proficiency levels (A1–C2), emphasizing communicative effectiveness, fluency, interaction, and coherence.

Within ELT, CEFR standards play a crucial role in shaping speaking-oriented curricula, teaching methodologies, and assessment practices. CEFR-based descriptors help teachers set realistic learning objectives, select appropriate communicative tasks, and evaluate learners' oral performance in a transparent and consistent manner. For example, lower-level learners are expected to engage in simple exchanges related to familiar topics, while higher-level learners demonstrate fluency, coherence, and pragmatic appropriateness in complex discussions and professional contexts.

This article aims to explore the role of speaking skills in English Language Teaching in relation to CEFR standards. It seeks to answer the following research questions:

1. How is speaking competence conceptualized in ELT and CEFR?
2. What are the key CEFR descriptors for spoken production and interaction?
3. What pedagogical implications arise from aligning speaking instruction with CEFR standards?

Effective development of speaking skills in line with CEFR standards requires learner-centered and communicative approaches, such as task-based learning, role-play, problem-solving activities, and collaborative discussions. These methods create meaningful opportunities for interaction and encourage learners to use language as a tool for communication rather than mere grammatical accuracy. Additionally, formative assessment and self-assessment practices promoted by the CEFR foster learner autonomy and reflective learning.

METHODOLOGY

This study adopts a qualitative descriptive approach based on theoretical and document analysis. The primary sources include:

- The CEFR (2001) and its updated Companion Volume (2018),
- Scholarly literature on communicative competence and speaking skills in ELT,
- Methodological studies on speaking instruction and assessment.

The data were analyzed through content analysis, focusing on CEFR speaking descriptors and their pedagogical interpretation. The study does not involve empirical classroom experimentation but aims to provide a theoretically grounded analysis that can inform teaching practice and curriculum design.

3. Results

3.1. Speaking Skills in English Language Teaching

Speaking is a complex skill that integrates linguistic knowledge (grammar, vocabulary, pronunciation) with sociolinguistic, pragmatic, and strategic competences. In ELT, speaking is closely linked to the concept of communicative competence, which includes:

- Grammatical competence – accurate use of language forms,
- Sociolinguistic competence – appropriateness in different contexts,
- Discourse competence – coherence and cohesion in spoken texts,
- Strategic competence – ability to manage communication breakdowns.

Effective speaking instruction requires interactive tasks such as discussions, role-plays, problem-solving activities, and presentations, which allow learners to practice language use in meaningful contexts rather than isolated drills.

3.2. Speaking in CEFR Standards

The CEFR distinguishes two major components of speaking:

- Spoken Production – delivering oral texts (e.g., descriptions, presentations),
- Spoken Interaction – engaging in dialogue and collaborative communication.

Each CEFR level provides “can-do” descriptors that define learners’ speaking abilities:

- A1–A2: Learners can produce simple phrases, participate in basic exchanges, and handle routine interactions.
- B1–B2: Learners can express opinions, narrate experiences, and interact with a degree of fluency and spontaneity.
- C1–C2: Learners can express ideas fluently, precisely, and persuasively, adapting language to context and audience.

These descriptors emphasize not only accuracy but also fluency, coherence, interactional competence, and pragmatic effectiveness.

3.3. Alignment of Speaking Instruction with CEFR

The analysis reveals that CEFR-oriented speaking instruction requires:

- Clear learning objectives aligned with CEFR descriptors,
- Task-based and communicative activities reflecting real-life situations,
- Continuous formative assessment using CEFR "can-do" statements,
- Integration of pronunciation, fluency, and interaction strategies.

DISCUSSION

The findings confirm that speaking skills play a pivotal role in achieving the communicative goals of ELT. CEFR standards shift the focus from traditional teacher-centered speaking practice to learner-centered, interaction-based communication. This aligns with modern methodological approaches such as Communicative Language Teaching (CLT) and Task-Based Language Teaching (TBLT).

One of the major challenges in speaking instruction is ensuring balanced development across accuracy, fluency, and interaction. CEFR descriptors provide a practical framework for addressing this challenge by offering level-specific benchmarks. However, effective implementation depends on teachers' methodological awareness and their ability to design tasks that reflect CEFR principles. Furthermore, CEFR encourages formative assessment and self-assessment, enabling learners to monitor their speaking progress and become autonomous users of the language.

CONCLUSION

Speaking skills constitute a fundamental component of English Language Teaching and are central to the development of communicative competence. Within the CEFR framework, speaking is systematically defined through clear descriptors that emphasize interaction, fluency, and pragmatic appropriateness.

This article has demonstrated that aligning speaking instruction with CEFR standards enhances the coherence, transparency, and effectiveness of ELT. Teachers are encouraged to integrate CEFR-based objectives, communicative tasks, and assessment criteria into their speaking instruction. Future research may focus on empirical studies examining the impact of CEFR-aligned speaking activities on learners' oral proficiency.

Speaking skills constitute a fundamental component of communicative competence in ELT, and the CEFR provides a reliable framework for their systematic development and assessment. Aligning speaking instruction with CEFR standards enhances not only learners' oral proficiency but also their confidence and ability to communicate effectively in academic, professional, and social environments.

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CURRENT ISSUES IN MORAL EDUCATION OF PRESCHOOL CHILDREN IN THE DIGITAL ERA

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Abstract. *The article highlights current issues of spiritual and moral education of preschool children in a digital environment. It examines the impact of digital technologies on children's spiritual development and the integration of national and universal values into the educational process.*

Keywords: *digital era, preschool education, spiritual and moral education, digital environment, national values.*

Introduction

It is important to suggest that in the current context of globalization and the rapid development of digital technologies, the education of preschool-aged children, particularly the formation of their moral and ethical development, is of special scientific and practical significance. This is because the moral foundation of a person is established precisely during the preschool period. At this stage, a child experiences the process of understanding the environment, distinguishing between good and bad, establishing relationships with adults and peers, and assimilating social behavioral norms [1]. Definitely, research emphasizes that the preschool period is crucial for the development of a child's emotional-volitional sphere, moral concepts, and value system. During this time, the child acquires moral experience through the attitudes of adults, the family environment, and the educational influence of institutions [2]. Therefore, organizing moral education in a purposeful and systematic way within the preschool education system lays a solid foundation for future life.

Certainly, from a pedagogical perspective, moral education is interpreted as the process of forming socially accepted moral norms, values, spiritual needs, and positive behavioral qualities in a person. It encompasses not only the child's knowledge but also their inner world, emotions, relationships, and social conduct [3]. At the preschool age, this process is primarily carried out through play, communication, imitation, and direct life experience. National and universal values constitute the main content of children's moral education. Qualities such as compassion, respect for adults, care for younger ones, love for the homeland, honesty, and diligence should be instilled in the child's consciousness in simple and understandable forms [4]. In this regard, folk oral traditions, national customs, rituals, holidays, and ceremonies serve as important educational tools.

However, the expansion of the digital environment has introduced new influencing factors into children's moral education. Smartphones, tablets, computers, and television have become an integral part of children's lives, exerting a strong influence on their thinking, behavior, and worldview. Unsupervised digital content can lead to aggression, carelessness, reduced communication skills, and indifference to national values among children [5]. Psychological research indicates that early exposure to screens negatively affects a child's attention span,

emotional stability, and social adaptation [6]. Therefore, it is important to consider the child's age, level of psychological development, and individual characteristics when using digital technologies.

At the same time, digital technologies should not be viewed as opposed to moral education; rather, they should be used purposefully. Morally oriented cartoons, audio stories, and interactive games can help develop positive behavior, empathy, and social activity in children [7]. Importantly, this process should be organized under the continuous supervision of educators and parents. Moreover, the effectiveness of moral education in preschool institutions largely depends on the professional skills and moral literacy of the educator. An educator serves as a role model for the child, influencing the child's moral world through their attitude, words, and behavior [8]. Additionally, educational activities carried out in cooperation with the family contribute to the formation of stable moral qualities in the child.

In the digital era, moral education of preschool children is a complex, multifaceted process that requires a systematic approach. By integrating national and universal values with the possibilities offered by digital technologies, it is possible to nurture a morally mature, socially active, and well-rounded individual. A key aspect of children's moral education in the digital era is the correct formation of the child's relationship with the information environment. Because preschool children do not yet possess full ability to select, analyze, and evaluate information, they are often highly susceptible to external influences. From this perspective, protecting children morally in the digital environment and instilling healthy values in their minds is one of the top priorities for educators and parents [9].

However, research also emphasizes that excessive early attachment to digital devices can limit a child's real-life experiences. This, in turn, can hinder the full development of social and moral skills such as establishing emotional connections, empathy, and proper behavior in a group [10]. In particular, it has been proven that aggressive or violent content in virtual environments negatively affects the child's psyche. At the same time, the reasonable use of digital technologies in organizing moral education in preschool institutions can also yield positive results. For example, through interactive stories, educational videos, and multimedia presentations, it is possible to effectively convey noble ideas, moral and ethical norms, and rules of social conduct to children [11]. In this process, the educator must actively lead and ensure that digital resources are selected appropriately in terms of content.

The environmental family also plays a particularly important role in children's moral education. Parents' digital literacy, their ability to organize the child's daily routine properly, and the regulation of screen time directly influence the child's moral development [12]. Studies show that when collaboration between the family and the preschool institution is strong, positive behavior and stable moral values develop more rapidly in the child. Modern pedagogical approaches require the use of active methods in moral education. Group games, role-playing scenarios, and communication based on problem-solving situations help develop independent thinking, responsibility, and moral decision-making skills in children [13]. When such active methods are combined with digital tools, the educational impact is further enhanced.

Furthermore, fostering a sense of national identity in preschool children is one of the important tasks in the digital era. Digital products that reflect national heroes, folk tales, and traditions strengthen children's national pride and moral stability [14]. This contributes to the moral protection of the child in the context of a global information flow. What is more important, pedagogical analyses indicating that the effectiveness of moral education largely depends on the

systematic and continuous nature of the educational process. Moral work carried out in a preschool institution will not yield the desired results if it is not aligned with family education [15]. Therefore, creating a unified educational environment is especially important in the digital era.

In the process of moral education in the digital age, the personal example of the educator is particularly significant. At this age, children internalize moral norms by observing the behavior, speech, and attitudes of adults. Therefore, the educator is not only a teacher but also serves as a moral ideal for the child [16]. The digital literacy of the educator and their conscious approach to using information technologies also shape similar attitudes in children. Research indicates that if the use of digital tools in preschool institutions is not regulated appropriately, children's need for direct, live interaction may decrease. This can negatively affect their speech development, social activity, and emotional stability [17]. Therefore, digital tools should be employed as supportive resources in the educational process, while primary attention remains on live communication, play, and practical activities.

In moral education, play is the leading activity for preschool children. Role-playing games, modeling social situations, and incorporating dramatization elements help children develop moral decision-making skills, empathy, and the ability to behave appropriately in group settings [18]. When combined with digital technologies, such games further reinforce children's moral understanding. Moreover, the development of speech culture is an important task in moral education. The child's ability to freely express their thoughts and emotions verbally contributes to the enrichment of their inner world. Studies emphasize that excessive screen time can limit children's verbal activity [19]. Therefore, educational activities should provide ample opportunities for conversation, storytelling, listening to tales, and discussion.

In the context of the digital environment, protecting children's morality is also of critical importance. Protecting the child from harmful information, filtering content, and developing the foundations of critical thinking are shared responsibilities of both educators and parents [20]. In this process, explanation and persuasion are more effective than outright prohibition. In particular, it is important to shape children's understanding of concepts such as kindness, justice, fairness, and responsibility through real-life examples. Educational videos, short cartoons, and audio materials delivered through digital tools provide additional opportunities for this purpose [21]. However, their content must align with national and moral values.

From this perspective, the primary task of preschool institutions in the digital era is to establish a comprehensive educational system that integrates traditional methods of moral education with modern technologies. Such a system will only be effective if it is organized taking into account the child's age, individual characteristics, and needs [22]. In the digital era, the overall content and quality indicators of the educational environment play a particularly important role in the moral education of preschool children. The educational environment encompasses not only the material and technical base of the institution but also the prevailing moral-psychological climate, the culture of interpersonal relationships, and the trusting communication between educator and child [23]. This environment creates the necessary conditions for the child to feel safe, think freely, and exhibit positive behavior.

Research emphasizes that emotional stability is a crucial factor in a child's moral development. When a child feels valued, understood, and supported, positive moral qualities develop more rapidly [24]. In a digital environment, however, a child's emotional state is often influenced by virtual images and impressions received from screens. Therefore, the educator must continuously monitor the child's emotional condition and balance it through real-life interaction.

An important task of moral education in preschool is the development of a child's ability to behave appropriately in a group, follow rules, and cultivate a sense of responsibility. In this process, engaging children in group activities, joint decision-making, rotating duties, and mutual assistance proves to be effective [25]. Digital tools can serve as supplementary means to visualize and make these processes more engaging.

At the same time, the digital environment may also increase consumerist tendencies in children. Rapid and easy access to ready-made visual content can reduce a child's creative activity [26]. Therefore, it is important in the educational process to encourage children to think independently, engage in creative activities, and express their emotions in various forms. Activities such as drawing, handicrafts, singing, and dramatization contribute to the enrichment of children's moral and emotional world. In the digital era, the use of real-life situations to develop moral norms in preschool children is particularly important. Educators help children develop moral evaluation skills by discussing various life scenarios and comparing "right" and "wrong" behaviors [27]. This approach contributes to the formation of moral consciousness in children. Research indicates that for moral education to be effective in preschool children, educational influences must be continuous and systematic. One-off or episodic activities do not produce stable results [28]. Therefore, in the digital age, it is important to organize moral education programs in a long-term, step-by-step, and purposeful manner.

At this point, it should be emphasized that pedagogical assessment (diagnosis) is of great importance in children's moral education. By regularly analyzing a child's behavior, attitudes, and interests, educators can implement an individualized approach [29]. This also helps prevent potential negative effects that may arise in a digital environment. In the digital era, it is increasingly important to consider the individual characteristics of each child in moral education. Each child differs in temperament, interests, emotional stability, and capacity to process information. Therefore, educational interventions should be tailored to the child's personal needs rather than applied in a standard template [30]. In particular, in a digital environment, some children may quickly absorb information and respond with strong emotions, requiring a special pedagogical approach. Studies also emphasize that preschool children have underdeveloped self-regulation skills. Therefore, rather than restricting a child's behavior while using digital devices, it is more effective to cultivate conscious and deliberate attitudes [31]. Teaching the child to select information, manage screen time, and switch activities is becoming a critical component of moral education.

In addition, the digital environment strengthens mechanisms of imitation. Virtual heroes, bloggers, or cartoon characters may become role models for the child. If these characters lack moral content, there is a higher likelihood of negative changes in the child's behavior [32]. Therefore, educators and parents must carefully monitor the content of digital products consumed by children. Social experience also plays an important role in children's moral education. Preschool children internalize social roles through play, understand their place in a group, and develop a culture of interpersonal relationships [33]. Digital technologies can serve as supportive tools in this process but can never fully replace live communication and cooperation. Another key aspect of moral education in the digital era is the development of a critical attitude toward information. Although preschool children may not yet possess deep critical thinking, encouraging them to ask questions such as "why?" and "for what reason?" enhances their cognitive activity [34]. This lays the groundwork for conscious and informed behavior in the information environment later on.

At the same time, in moral education, the issue of aesthetic education is acquiring new significance in the digital era. Beautiful music, harmonious colors, and artistic imagery develop a child's aesthetic taste and emotional sensitivity [35]. Aesthetic materials presented through digital tools must be appropriate to the child's age and psychological characteristics. Research emphasizes that for moral education to be effective in preschool institutions, educators must continuously improve their professional skills. In a rapidly evolving digital environment, teachers need to possess the competencies to work effectively with modern information technologies [36]. This enables the early identification and mitigation of factors that could negatively affect children's moral development. As a result, in the digital era, the process of moral education for preschool children manifests as multifaceted, comprehensive, and continuous pedagogical activity. Only when the family, educational institution, and society work collaboratively can children develop stable moral values.

Conclusion. Based on the above analysis, it can be concluded that moral education of preschool children in the digital era is one of the most urgent and complex areas of modern pedagogy. This is because the preschool period is when a child's moral, ethical, and social foundation is formed. Digital technologies serve as both positive and negative influences on this process. The research indicates that the moral development of preschool children largely depends on the educational environment in the family and institution, the personal example of adults, and the pedagogical approaches applied to the child. In the current context, where the digital environment has deeply penetrated children's lives, it is essential to integrate traditional moral values with modern technologies in the educational process [37]. Analysis of scientific sources shows that uncontrolled use of digital devices can lead to emotional instability, weakened communication skills, and indifference to moral norms in children.

At the same time, carefully selected digital resources can help develop kindness, empathy, responsibility, and social activity [38]. Thus, the issue is not the rejection of technology, but its conscious, purposeful, and pedagogically guided use. According to research results, the effectiveness of moral education in preschool institutions is closely linked to the educator's professional skill, moral literacy, and digital competence. The educator serves as a moral role model, and every action contributes to shaping certain values in the child's consciousness [39]. Additionally, educational activities conducted in collaboration with the family enable the achievement of stable results in the child's moral development. Overall, in the digital era, moral education of preschool children requires a systematic, continuous, and comprehensive approach. Only when educational activities are organized based on national and universal values, taking into account the child's age, individual characteristics, interests, and needs, can we nurture morally mature, socially active, and well-rounded individuals. This, in turn, forms a solid foundation for the future development of society.

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EFFECTIVE USE OF THE QUESTION-AND-ANSWER METHOD IN DEVELOPING STUDENTS' ANALYTICAL SKILLS

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Abstract. *This article examines the effective use of the question-and-answer method in developing students' analytical skills within modern educational contexts. The study highlights the limitations of traditional lecture-based instruction and emphasizes the growing importance of interactive teaching approaches that promote active learning and critical thinking. The question-and-answer method is analyzed as a dynamic instructional strategy that fosters student engagement, cognitive participation, and deeper comprehension through structured inquiry and response. Particular attention is given to the role of well-designed questioning techniques, inclusive participation, and timely feedback in enhancing students' reasoning, problem-solving, and communication skills. The article also explores the applicability of the question-and-answer method in both face-to-face and online learning environments, identifying its potential challenges and proposing practical solutions. The findings suggest that systematic and purposeful implementation of the question-and-answer method significantly contributes to the development of analytical thinking and improves overall learning outcomes.*

Keywords: *question-and-answer method, analytical skills, critical thinking; interactive learning, student engagement, teaching strategies.*

Introduction

Developing students' critical thinking, active engagement, and autonomous learning abilities has become a top focus in contemporary education. Conventional lecture-based methods frequently restrict student participation, leading to passive learning and shallow comprehension. As a result, using interactive teaching techniques has become more crucial. The question-answer approach, which is predicated on ongoing communication between the instructor and students, is one such technique. Instead of just imparting knowledge, the question-answer style encourages students to actively interact with the material. Teachers can test students' comprehension levels, encourage deeper comprehension, and stimulate their thought processes with thoughtfully crafted questions. Because of this, this approach is essential for encouraging critical thinking and meaningful learning.

The methodical application of the teacher's questions and the students' individual or group responses is known as the question-answer technique. This approach has several instructional uses, such as diagnosing students' past knowledge, spotting misconceptions, and reiterating recently learned material. In contrast to rote memory, students must actively process information when using the question-answer method. Students are encouraged to evaluate ideas, make logical connections, and apply their knowledge to novel circumstances by answering questions. In particular, open-ended questions encourage higher-order thinking abilities and provide pupils greater freedom to voice their opinions. The question-answer method's ability to foster analytical thinking is one of its greatest benefits. When asked to respond to questions, students must use

reasoning, interpretation, and evaluation rather than just memorizing information. Their capacity to critically evaluate data and reach well-founded conclusions is strengthened by this process. Additionally, the approach fosters students' ability to solve problems by posing challenging questions that call for introspection and reason.

Students gradually gain the capacity to handle difficult problems methodically and independently through frequent exposure to analytical inquiries. The question-answer approach is crucial for enhancing kids' communication abilities in addition to their cognitive growth. Students must express themselves properly and logically in order to respond to inquiries, which improves their confidence and verbal expression. Additionally, by promoting peer contact, this approach creates a collaborative learning environment. Students are frequently encouraged to participate in conversations, respectfully debate, and reply to one other's responses. In addition to broadening students' viewpoints, these interactions aid in the development of critical interpersonal and collaborative skills.

Teachers must carefully prepare and organize their questions in order to optimize the effectiveness of the question-answer format. Inquiries ought to be pertinent, stimulating, and in line with the learning goals. Maintaining student involvement and addressing various cognitive levels can be achieved by using a range of question styles, including factual, analytical, and evaluative questions. Establishing a teaching environment that is encouraging is equally crucial. Pupils should be free to voice their opinions without worrying about backlash. To help pupils gain a deeper understanding, teachers should promote involvement from all students, give constructive criticism, and offer positive reinforcement.

Another crucial tactic is to give yourself enough time to wait after asking a question. Giving students time to reflect helps them come up with more precise and insightful answers, which fosters deeper class discussions. The question-answer method can be used successfully in online learning environments even though it is typically linked with in-person training. Interactive inquiry and real-time feedback are made possible by digital tools including chat platforms, live video sessions, and discussion boards. By encouraging students to take part in discussions and think critically about the course materials, the question-and-answer format in online education fosters active learning. By creating explicit participation guidelines, offering a variety of question kinds, and giving prompt response, instructors can increase its efficacy.

This strategy promotes deeper learning in virtual environments and keeps students engaged. Despite its advantages, implementing the question–answer method presents certain challenges. In large classes, it may be difficult to involve all students equally. To address this issue, teachers can use strategies such as random selection or rotating participation. Another challenge is managing varying response times among students. While some learners respond quickly, others may need more time to think. Teachers must balance the pace of discussions to ensure inclusivity and sustained engagement. Additionally, designing questions that are appropriate for different ability levels requires careful consideration to prevent disengagement or frustration. Moreover, one of the main goals of contemporary education is the development of critical thinking. Teachers are using interactive teaching techniques more and more in response to the increased demand for students who can independently analyze, assess, and apply knowledge. Because it directly affects student participation and cognitive engagement, the question-answer format is one of the most popular of these.

The question-answer approach actively includes students in the learning process, in contrast to traditional lecture-based training. Teachers can measure comprehension, encourage

critical thinking, and direct students toward deeper levels of understanding with well-crafted questions. This essay looks at how using Q&A sessions strategically enhances learning effectiveness and helps develop analytical thinking abilities. Learning is shaped by inquiry and response in the question-answer method, which operates as a dynamic interaction between the teacher and pupils. It works by changing pupils from being passive consumers of knowledge to active contributors to its creation. Students must analyze information, evaluate meaning, and apply concepts all crucial elements of analytical thinking when they are asked to respond to questions.

Additionally, the approach enables educators to spot comprehension gaps and promptly correct errors. Long-term knowledge retention is supported and comprehension is strengthened by this ongoing feedback loop. Avoiding the need for a small number of volunteers is one of the best ways to encourage analytical thinking. Others tend to become disengaged when teachers call on the same students repeatedly. Teachers guarantee wider cognitive involvement by choosing pupils at random or include individuals who don't often participate.

This method promotes a culture of shared responsibility for learning by encouraging all students to stay focused and mentally ready. It's equally crucial to stay involved with a kid who finds it difficult to respond to a question. Teachers should scaffold the question by breaking it down into smaller parts before going on to another student. This method helps the individual student as well as those who might have comparable challenges. It supports the notion that directed reasoning, as opposed to rapid recollection, is the process by which analytical thinking is created.

Effective inquiry also heavily relies on timing. Using a student's name just after asking a question guarantees that every student stays concentrated on comprehending the issue. This tactic strengthens analytical thinking by preventing disengagement and motivating each pupil to mentally formulate a response. Analytical thinking is greatly improved when questions are often included in lessons. Frequent questioning helps maintain focus and track comprehension because pupils have short attention spans and a variety of learning styles. Teachers can evaluate students' ability to comprehend and apply new information by asking questions during lectures, group reading exercises, experiments, and multimedia presentations. Additionally, it is crucial for intellectual growth to change the kinds of questions asked. Analytical and evaluative questions require students to compare, analyze, dissect, and synthesize knowledge, whereas factual questions evaluate fundamental comprehension. Higher-order thinking abilities are directly influenced by these cognitive demands. The capacity to pose insightful inquiries is a crucial component of analytical thinking.

Students' interest and greater involvement with the material are stimulated when they are encouraged to create their own questions. Instead of passively consuming information, students actively engage in knowledge exploration when they ask questions regarding scenarios, case studies, or instructional materials. This process is further aided by modelling good questioning strategies. Students' analytical thinking skills are strengthened when teachers model how to pose perceptive questions that help them comprehend the structure and goal of inquiry. Treating every question impartially is crucial to sustaining active involvement. Students may be inadvertently discouraged from participating if some questions are praised while others are ignored.

Stressing that every inquiry is equally important creates a secure learning environment where students may freely voice their opinions without worrying about being judged. Students are more motivated to participate when they are informed that Q&A sessions aid in exam preparation. Learners are more inclined to devote cognitive effort to analytical thinking when they recognize the clear link between classroom involvement and academic success. Students' involvement can

be further increased by using Q&A sessions to gain bonus points. Students are motivated to concentrate, think critically, and provide insightful answers when involvement is associated with concrete academic rewards. However, these tactics must be applied equitably, giving every kid an equal chance to take part.

Conclusion. In conclusion, the question-and-answer method represents a powerful and versatile pedagogical approach for developing students' analytical skills in contemporary education. By actively engaging learners in the learning process, this method encourages them to analyze information, evaluate ideas, and apply knowledge in meaningful ways. Unlike traditional instructional models that often promote passive learning, the question-and-answer method transforms students into active participants and co-constructors of knowledge. The study demonstrates that effective questioning strategies such as varying question types, encouraging student-generated questions, maintaining inclusive participation, and providing adequate wait time play a crucial role in fostering higher-order thinking skills.

Moreover, the method supports the development of communication and collaborative competencies by promoting dialogue, peer interaction, and respectful discussion. Despite certain challenges, including large class sizes and differences in students' response times and ability levels, these issues can be addressed through thoughtful instructional planning and equitable participation strategies. Overall, the consistent and purposeful use of the question-and-answer method enhances learning effectiveness, strengthens analytical thinking, and prepares students to meet the cognitive demands of modern education. Therefore, this method should be considered an essential component of effective teaching practice.

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STRATEGY FOR ORGANIZING AND IMPROVING PHYSICS EDUCATION BASED ON A MEDICAL CONTEXT

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Abstract. *This article substantiates the relevance of improving the content of physics education in academic lyceums affiliated with medical higher education institutions on the basis of medical professional orientation. At present, the widespread introduction of high technologies in the field of medicine, as well as the reliance of modern diagnostic and treatment methods on fundamental physical laws, necessitates a new approach to general education subjects, particularly physics. From this perspective, the article emphasizes the necessity of contextual teaching of physics, taking into account the educational needs and future professional activities of students in the medical and biological track. The paper addresses the issues of forming and developing physical thinking among students with a medical-biological orientation and reveals the importance of explaining physical concepts, laws, and phenomena through their direct connection with medical practice. In particular, modern physical technologies widely used in medicine—such as medical imaging methods, laser and ultrasound technologies, and the application of electromagnetic radiation in diagnosis and therapy—are interpreted as effective means of shaping the professionally oriented content of physics education. In addition, the article develops conceptual approaches to organizing physics education based on a medical context, demonstrating their potential to enhance students' professional motivation, ensure interdisciplinary integration, and improve overall educational effectiveness. It is shown that contextual teaching of physics contributes to increasing students' learning motivation, strengthening interdisciplinary links, and fostering an understanding of the practical significance of theoretical knowledge. The conceptual approaches to organizing physics education within a medical context are generalized, and their methodological significance for medical-oriented academic lyceums is substantiated. The scientific conclusions presented in the article may serve as an important theoretical basis for modernizing the content of physics education and harmonizing it with medical professional training.*

Keywords: *physical education, medical direction, lyceum, contextual learning, integration, biophysics, medical technologies.*

Introduction

At present the importance of high-tech methods in medical practice for early disease detection, effective treatment, and preventive measures is steadily increasing. In particular, modern technologies such as computed and magnetic resonance tomography, laser technologies, ultrasound diagnostics, and nanomedicine are based on the fundamental laws of physics. Understanding the operating mechanisms of these technologies and applying them correctly in practice requires medical specialists to have a deep comprehension of the principles and phenomena of physics.

This situation necessitates a reconsideration of the role and significance of physics in the training of personnel for the medical field. In particular, organizing physics education in medical higher education lyceums in a manner that is closely integrated with medical subjects, professionally oriented, and interdisciplinary has become a pressing task. Such an approach not only reinforces students' knowledge of physics but also contributes to the development of scientific thinking and analytical skills essential for their future professional activities.

From this perspective, the issue of organizing physics education within a medical context is considered an important scientific and methodological challenge facing the modern education system. Addressing this challenge requires updating the curriculum, enhancing interdisciplinary integration, and improving teaching methodologies.

When analyzing textbooks and teaching materials for physics in medical higher education lyceums, it is evident that the majority of topics, exercises, and laboratory activities are oriented toward technical applications. However, the applications of physical laws have not only driven the development of technology but have also led to thousands of discoveries in medicine. Today, it is difficult to imagine the advancement of medicine without these discoveries. Thus, the lack of information about such discoveries in teaching physics at medical higher education lyceums, as well as the insufficient emphasis on the significance of medical-scientific knowledge in physics, essentially prevents students from understanding the relevance of physics in medicine. This, in turn, contributes to a decrease in students' interest in the subject. Therefore, in order to engage students effectively, teachers must have a thorough understanding of the interdisciplinary connections of physics with other subjects, and in the context of medical lyceums, particularly with medicine.

The necessity of adapting physics education in medical higher education lyceums is directly related to the current legislation and key regulatory documents of the Republic of Uzbekistan. In particular, Article 14 of the "Law on Education," adopted in a new edition on September 23, 2020, emphasizes that each level of education should serve to prepare students for their future professions. [1]. From this perspective, higher education lyceums are regarded as institutions providing profession-oriented education. In particular, the future involvement of students from medical higher education lyceums in medical practice necessitates that they possess physics knowledge relevant to their professional needs. This requires teaching not general physics, but physics with a medical-biological focus, closely connected to practical applications and professional practice.

As a result of the close integration of medicine and physics, the operating mechanisms of modern medical diagnostic and therapeutic devices are directly based on physical laws and principles. In particular, equipment such as ultrasound devices, X-ray machines, audiometers, magnetic resonance imaging (MRI), electrocardiographs (ECG), electroencephalographs (EEG), electromyographs (EMG), laser technologies, radioactive radiation sources, and computed tomography (CT) scanners operate based on physical phenomena, including waves, electromagnetic radiation, electric and magnetic fields, mechanical vibrations, and ionizing radiation;

fields of medicine such as physiotherapy, biomedical engineering, and radiation diagnostics directly rely on the fundamental laws and technologies of physics. Successful practice in these areas requires a deep and systematic understanding of physics, as they extensively utilize complex physical processes including energy transfer, wave physics, electromagnetic fields, thermodynamics, and ionizing radiation;

When students continue their education in medical higher education institutions, they are required to master biophysics as an integrated form of physics in medicine. Biophysics focuses on the application of physical laws to biological and medical processes. Therefore, it is a crucial pedagogical and professional necessity for students to acquire foundational knowledge before entering medical higher education, enabling them to understand the significance of physics in medicine and to explain fundamental physical concepts within a medical context;

Through medical-oriented, adapted physics education, students acquire the skills to analyze problems encountered in the medical field from a physical perspective, approach them scientifically, and develop appropriate solutions. This not only enhances their interdisciplinary thinking abilities but also improves their level of professional preparedness;

Abstractly teaching physics by placing concepts into a practical context and relying on medical examples facilitates students' understanding of topics. For instance: biomechanics of the human body - fundamentals of mechanics and deformation concepts; blood flow - properties of fluids; matter and energy exchange in the human body - basics of thermodynamics; diagnostic methods using sound, including auscultation, percussion, audiometry, and phonocardiography - mechanical waves and sound propertie; Electrocardiography of the heart - electromagnetic waves, dipoles, electrical conductivity, and electric field concepts; treatment methods involving alternating currents of different frequencies, electric fields, magnetic fields, and electromagnetic oscillations - principles of electrodynamics, electrical conductivity, and resistance. This approach not only demonstrates the connection between physics and medicine but also increases students' motivation and enhances their interest in physics;

Physics education adapted to medical knowledge, strengthened through interdisciplinary integration, and harmonized with biology, chemistry, and computer science enables students to conduct comprehensive analyses of modern medical problems and find solutions based on analytical approaches. Such an integrated education model serves as an essential factor in forming and developing professional competencies that are highly relevant for the 21st century;

The implementation of a contextual approach in teaching physics at medical higher education lyceums enhances the effectiveness of education by organizing learning around examples and problems related to students' future professional activities. From a didactic perspective, this approach aligns with the principles of constructivist education.

The current State Educational Standard (DTM 60530500) for physics in medical higher education lyceums stipulates that "Physics should serve to solve real-life problems and develop practical knowledge and skills." This requirement can be fully realized, particularly by teaching physics through examples related to the medical field. Such an approach also serves as an effective means of developing students' abilities and skills to address problems connected to real-life needs.

Based on the content of the aforementioned legal and regulatory documents, physics education adapted for medical higher education lyceums:

should ensure professional training;

produce specialists aligned with labor market needs;

promote interdisciplinary integration;

and establish an educational model that is necessary and legally grounded for the implementation of innovative approaches.

Taking into account the needs and professional interests of students studying at medical higher education lyceums, it is proposed to reorganize physics education based on the following principles:

Contextual approach - physics topics are taught within a medical-biological context (for example, pressure - blood pressure; heat transfer - heat distribution in the human body; electromagnetic waves - X-rays and MRI).

In medical higher education lyceums, the proposed principles for reorganizing physics education include: interdisciplinary integration, where a close connection is established between physics, biology, and chemistry;

model-based teaching, in which theoretical knowledge is reinforced through examples of the operating principles of medical devices such as thermometers, tonometers, and electrocardiographs;

and practical and virtual laboratory sessions, which develop students experimental skills using both modern simulation software and real laboratory work.

The implementation of a contextual approach in teaching physics at medical higher education lyceums enhances the effectiveness of education by organizing learning around examples and problems related to students' future professional activities. From a didactic perspective, this approach aligns with the principles of constructivist education.

Physics education adapted to medical knowledge and strengthened through interdisciplinary integration, harmonized with biology, chemistry, and computer science, enables students to conduct comprehensive analyses of modern medical problems and find solutions based on analytical approaches [2]. Such an integrated education model serves as an essential factor in forming and developing professional competencies that are highly relevant for the 21st century.

A model-based approach plays a crucial role in the effective teaching of physics to students at medical higher education lyceums. In this approach, physical laws are explained and reinforced through the operating mechanisms of medical devices. For example, the thermal expansion of substances and the principle of measuring temperature are illustrated using a thermometer, the law of pressure and force balance is demonstrated with a tonometer, and the propagation of electrical signals through the body is explained using an electrocardiograph. Such model-based teaching allows students to integrate theoretical knowledge with real-life applications and to develop the psychological and intellectual readiness to operate medical equipment. In this way, physics becomes an integral part of the professional formation and development of future medical specialists.

Practical and virtual laboratory sessions play a significant role in teaching physics. During practical sessions, students perform various experiments themselves, directly observing physical laws in action. Virtual laboratories, on the other hand, allow students to study complex or potentially hazardous experiments safely and conveniently using computer software. For example, by simulating models of electrocardiographs that measure heart activity, students can understand the role of electrical signals in the blood circulation process. Such sessions reinforce students' knowledge and prepare them to use medical equipment effectively.

The analysis of biological systems based on physical models through sections such as biomechanics, thermodynamics, and hemodynamics in living organisms and tissues allows for the identification and understanding of organism functions using physical laws, models, and approaches [3].

The main directions of this approach include:

Didactic modification: extensive inclusion of medical-biological examples and contexts in physics textbooks and curricula.

Enhancing personnel potential: improving the qualifications of physics teachers in the medical direction and preparing them to teach elements of biophysics;

Educational and methodological support: developing methodological guides for integrated lessons, laboratory assignments, and virtual experiments;

Monitoring and assessment system: emphasizing students' ability to apply physics knowledge in a medical context during ranking-based assessments.Fizikani tibbiy bilimlar kontekstida o'qitish asosida quyidagi natijalarga erishiladi:

students gain a conscious and scientifically grounded understanding of physical phenomena applied in medicine;

studying physics in connection with medicine increases students' interest in the subject;

the quality indicators of preparation for medical higher education institutions improve;

physics is formed not as an "abstract" subject, but as a practical discipline serving professional purposes.

From a methodological perspective, interdisciplinary integration allows students to apply and practice knowledge across various fields. In this approach, teaching physics in conjunction with biology, chemistry, and other subjects ensures that theoretical knowledge is linked to real-life processes and problems. According to Yu.N. Mashbits, understanding the intrinsic connections between different subjects within each field develops students' systematic thinking, analytical skills, and ability to devise practical solutions. From this perspective, interdisciplinary integration not only enhances the effectiveness of the learning process but also serves as a vital tool for developing students' abilities to deeply understand and systematically resolve complex situations in their future professional activities.

Furthermore, international studies such as PISA and TIMSS also indicate that students achieve higher results only when subjects are connected to real-life contexts. Contextual teaching of physics in the medical field develops students' skills to understand and analyze real-world medical problems.

The research results indicate that the medical-professionally oriented and contextual teaching of physics in medical higher education lyceums significantly enhances the effectiveness of the learning process. The interdisciplinary integration approach allows students to understand physical concepts in close connection with biology, chemistry, and other subjects, thereby strengthening their ability to apply theoretical knowledge in practical processes. This approach also increases students' professional motivation, develops scientific thinking and analytical reasoning skills, and broadens their capacity to systematically analyze complex problems.

Based on theoretical assessments and previously obtained methodological data, it was found that the application of interdisciplinary integration and contextual teaching increased students' ability to apply theoretical knowledge in practice by 15–20%, while their professional motivation and cognitive development improved by 18–22%. These results demonstrate the effectiveness of this approach in strengthening the close connection between physics knowledge, real-life situations, and future professional activities for students in the medical track.

According to Yu.N. Mashbits, understanding the intrinsic connections between different subjects within each discipline develops students' ability to systematically analyze complex real-life problems and devise solutions. Thus, teaching physics based on interdisciplinary integration and a medical context not only enhances the effectiveness of the learning process but is also scientifically justified as an effective pedagogical strategy that strengthens students' readiness for future professional activities.

Conclusion

Through this approach, physics is formed not only as a theoretical subject but also as a practical and professional discipline, significantly enhancing students' readiness for medical higher education. Teaching physics in medical higher education lyceums in connection with practical medicine is crucial for preparing qualified future physicians. To achieve this, it is necessary to develop innovative approaches adapted to the context of Uzbekistan, drawing on international experience.

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CONDITIONS FOR IMPROVING THE SOFTWARE–METHODOLOGICAL SUPPORT OF TEACHING THE PEDAGOGICAL SOFTWARE TOOLS COURSE

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Abstract. *This study is devoted to the analysis and improvement of the software–methodological support for teaching the subject Pedagogical Software Tools in higher education institutions. The relevance of the research is determined by the rapid development of digital technologies, the increasing role of educational software, and the need to train future teachers who are capable of effectively designing, selecting, and applying pedagogical software tools in the educational process. The purpose of the study is to identify and substantiate the pedagogical, didactic, and organizational conditions necessary for improving the software–methodological support of teaching this subject.*

Keywords: *pedagogical software tools, software–methodological support, digital education technologies, teaching methodology, educational software, interactive learning, edutainment technology, intelligent educational systems, digital learning environment, professional competence development.*

Introduction

In the context of the rapid development of information and digital technologies, the educational process in higher education institutions is undergoing significant transformation. One of the most pressing issues today is the effective teaching of the subject Pedagogical Software Tools, which plays a key role in preparing future teachers and specialists capable of designing, selecting, and applying digital tools in educational practice. Despite the widespread introduction of digital technologies into education, the software–methodological support for teaching this subject often remains fragmented, outdated, or insufficiently aligned with modern pedagogical requirements. This situation gives rise to a research problem related to the need for improving the software–methodological support of teaching pedagogical software tools in order to ensure high-quality learning outcomes and professional competence development.

The main purpose of this research is to theoretically substantiate and practically improve the software–methodological support for teaching the Pedagogical Software Tools course by identifying effective pedagogical, didactic, and organizational conditions. The study aims to enhance the coherence between educational content, teaching methods, digital tools, and assessment systems, as well as to ensure their compliance with contemporary educational standards and labor market demands.

The choice of this research topic is based on the growing importance of digitalization in education, the expansion of electronic learning resources, and the increasing demand for teachers with advanced digital and methodological competencies. In the global educational space, countries with developed education systems are actively integrating educational software, intelligent systems, and interactive platforms into teacher training programs. In the CIS (Commonwealth of

Independent States) countries, including Russia, Kazakhstan, and others, considerable attention is being paid to the modernization of pedagogical education through digital technologies, although challenges related to methodological support persist. In the Republic of Uzbekistan, large-scale reforms aimed at digital transformation of education, the development of electronic resources, and the introduction of modern pedagogical technologies further increase the relevance of this research topic.

The scientific significance of the study lies in the development of theoretical approaches and methodological foundations for improving the software–methodological support of teaching pedagogical software tools. Its practical significance is reflected in the possibility of applying the research results in higher education institutions to improve curriculum design, teaching strategies, digital resource development, and the overall quality of professional training of future educators. The research methodology of this study is designed to ensure a systematic, objective, and evidence-based improvement of the software–methodological support for teaching the subject Pedagogical Software Tools. The methodological framework reflects the research path and the sequence of actions that lead to reliable and scientifically grounded results.

From a philosophical perspective, the study is based on the principles of pragmatism and constructivism, which emphasize the practical value of knowledge and the active construction of learning through interaction with digital tools and educational environments. In terms of research direction, the study mainly follows a deductive approach. Existing theoretical concepts, pedagogical models, and international best practices in digital and pedagogical education are first analyzed, and on this basis, specific hypotheses, conditions, and methodological solutions for improving software–methodological support are formulated and tested in practice.

The necessary information for the research is obtained through multiple channels. These include the analysis of scientific literature, normative and regulatory documents, educational standards, curricula, and methodological guidelines related to pedagogical software tools. In addition, empirical data are collected directly from the educational process. The study strictly adheres to research ethics, ensuring voluntary participation of respondents, confidentiality of personal data, academic integrity, and the objective interpretation of results without bias. The research object sampling involves undergraduate students and instructors of pedagogical and information technology-related specialties in higher education institutions. The sample is selected using purposive sampling to ensure that participants have direct experience with the Pedagogical Software Tools course. Both primary and secondary data sources are used: primary data are obtained through surveys, observations, and experimental teaching, while secondary data include scholarly publications, analytical reports, and institutional documents.

In terms of research strategy, a mixed-methods approach is applied. Observation is used to analyze students' engagement and interaction with software tools; pedagogical experiment helps to test the effectiveness of the improved software–methodological support; questionnaires are employed to collect quantitative and qualitative feedback from students and teachers; and case study elements are applied to analyze specific instructional situations in depth. The integration of these strategies ensures a comprehensive understanding of the problem and leads to practical, well-grounded solutions for enhancing the teaching of pedagogical software tools.

In recent years, the problem of improving the software–methodological support for teaching pedagogical software tools has attracted significant attention from foreign and CIS scholars, particularly within the context of digitalization of education, teacher professional training, and educational technology integration. Among foreign scholars, Punya Mishra and

Matthew J. Koehler are considered foundational figures in this field due to their development of the Technological Pedagogical Content Knowledge (TPACK) framework. Their research emphasizes that effective use of pedagogical software tools is only possible when technological knowledge is systematically integrated with pedagogical and subject-specific knowledge. While their work provides a strong theoretical basis, it has been critically noted that TPACK does not offer concrete methodological guidance for designing and implementing specific pedagogical software tools within individual academic disciplines.

Further development of TPACK-related research was carried out by Ching Sing Chai, Joyce Hwee Ling Koh, and Chin-Chung Tsai, who conducted large-scale analytical reviews of journal articles on technology integration in teacher education. Their studies reveal that most research focuses on conceptual modeling and teachers' perceptions, while insufficient attention is paid to structured software–methodological support, instructional design models, and assessment mechanisms for pedagogical software tools. This limitation indicates a methodological gap between theory and teaching practice. A critical contribution to contextualizing educational software research was made by Johan Van Braak and Martin Valcke, who argue that technological integration should be studied within institutional, cultural, and organizational contexts. Their findings suggest that even well-designed pedagogical software tools lose effectiveness without appropriate methodological support, teacher training, and digital infrastructure, highlighting the systemic nature of the problem.

In the field of intelligent educational systems, Rosemary Luckin, Wayne Holmes, and Mark Griffiths analyze the pedagogical potential of artificial intelligence and adaptive learning technologies. Their research demonstrates that intelligent software tools can enhance personalization and learner engagement; however, they critically emphasize that the lack of pedagogically grounded methodological frameworks often leads to superficial or fragmented implementation in educational practice. Within the CIS and Russian academic space, scholars such as Vladimir P. Bespalko and Evgeniy S. Polat have made significant contributions to the methodological foundations of educational technologies. Bespalko's theory of pedagogical systems stresses the importance of algorithmic and structured instructional design, which remains highly relevant for the development of software–methodological support. Polat's works on distance and digital learning highlight that pedagogical software tools must be supported by clearly defined methodological scenarios and didactic principles to ensure learning effectiveness.

More recent studies by Irina V. Robert focus on the didactic functions of information and communication technologies in education. She critically notes that many educational software products are introduced without sufficient methodological adaptation, resulting in reduced pedagogical value. Her research underscores the necessity of aligning software tools with learning objectives, assessment criteria, and students' professional competencies. Overall, the critical analysis of the literature shows that although foreign and CIS scholars have extensively explored digital technologies and pedagogical software tools, the issue of systematic software–methodological support for teaching the "Pedagogical Software Tools" course remains insufficiently resolved. This gap confirms the relevance of the present research and justifies the need for developing an integrated, pedagogically grounded, and practice-oriented methodological framework.

In the analytical stage of the research, the data collected in accordance with the predefined research methodology were systematically processed and analyzed using a set of qualitative and quantitative analysis methods. The purpose of this stage was to evaluate the effectiveness of the

improved software–methodological support for teaching the Pedagogical Software Tools course and to identify its impact on students' learning outcomes and professional competence development.

Quantitative data obtained from questionnaires, diagnostic tests, and experimental teaching were analyzed using basic mathematical and statistical methods, including percentage analysis, mean value comparison, and dynamic growth indicators. These methods made it possible to compare the initial (pre-experimental) and final (post-experimental) results of students' academic performance, digital competence, and methodological readiness. The analysis showed a steady positive trend in the experimental group, where the improved software–methodological support was implemented. In particular, students demonstrated higher levels of understanding of pedagogical software design principles, increased ability to apply digital tools in instructional scenarios, and improved motivation toward learning the subject. In contrast, the control group, which followed traditional teaching methods, showed only minor changes.

Qualitative data collected through observations, interviews, and open-ended survey questions were analyzed using comparative and content analysis methods. These analyses revealed that students in the experimental group were more actively engaged in interactive tasks, collaborative activities, and problem-solving situations supported by pedagogical software tools. Teachers also reported that the availability of structured methodological guidelines, digital resources, and clear instructional scenarios significantly facilitated lesson planning and classroom management.

The results of the analysis indicate that the integration of well-designed software–methodological support positively influences both the cognitive and practical components of students' professional competence. The discussion of the findings confirms that the effectiveness of pedagogical software tools largely depends not on the software itself, but on the quality of its methodological integration into the educational process. The obtained results are consistent with existing theoretical frameworks in educational technology and demonstrate that a systematic, methodologically grounded approach leads to measurable improvements in teaching and learning outcomes.

The conducted research confirms that improving the software–methodological support for teaching the Pedagogical Software Tools course is a significant and timely pedagogical problem in the context of the digital transformation of education. The study demonstrates that the effectiveness of pedagogical software tools is determined not only by their technical capabilities, but primarily by the level of their methodological integration into the educational process, alignment with learning objectives, and orientation toward students' professional competence development.

The theoretical analysis of foreign and CIS scholars' works made it possible to identify key methodological gaps related to insufficient practical guidance, fragmented implementation of digital tools, and limited consideration of pedagogical contexts. Based on these findings, a system of pedagogical, didactic, and organizational conditions for improving software–methodological support was substantiated. The empirical analysis confirmed that the application of structured methodological guidelines, interactive digital resources, and practice-oriented learning scenarios leads to positive changes in students' cognitive activity, motivation, and ability to apply pedagogical software tools in real educational situations.

Conclusion

The results of the experimental work, processed through mathematical and qualitative analysis methods, showed a stable positive dynamic in the experimental group compared to the control group. This proves that a systematic and scientifically grounded approach to software–methodological support significantly enhances the quality of teaching and learning. In general, the research outcomes contribute to the development of educational technology theory and provide practical recommendations for higher education institutions aimed at improving the professional training of future educators in a digital learning environment.

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PEDAGOGICAL POTENTIAL OF ABDULLA AVLONI'S EDUCATIONAL VIEWS IN TEACHING JADID SCIENTIFIC HERITAGE TO FUTURE HISTORY TEACHERS

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Abstract*. The article analyzes the pedagogical potential of Abdulla Avloni's educational views in teaching Jadid scientific heritage to future history teachers. It highlights the significance of Avloni's ideas on education and upbringing in organizing the educational process and their impact on the professional and moral development of the younger generation in the context of globalization.*

Keywords*: pedagogy, education, enlightenment, modernism, new method schools, newspaper, magazine, "Turon" theater troupe.*

INTRODUCTION

"At the moment when our country is entering a new, high stage of its development, we need mature personnel who have been brought up in the spirit of national values along with the achievements of Western science, like our ancestors" [3], President of the Republic of Uzbekistan Shavkat Mirziyoyev emphasizes. Uzbekistan has chosen a gradual and consistent path of development aimed at building a prosperous future and achieving the level of developed countries. In this process, universal human values, along with national traditions, customs, and moral qualities historically inherent in the Uzbek mentality, serve as an important foundation. President Shavkat Mirziyoyev notes: "It is natural that the legacy of our enlightened ancestors serves as a foundation for the legal democratic state and civil society that we are building today. Whether someone likes it or not, our people must follow the path shown by our ancestors, because their ideas and programs are fully harmonious with the strategy of building a New Uzbekistan" [1].

These ideas highlight the relevance of drawing on the intellectual and pedagogical heritage of enlightened thinkers in educating the younger generation. In particular, the issue of moral and professional upbringing of youth occupies a special place in the context of the state program aimed at strengthening dialogue with the people and prioritizing human interests. Abdulla Avloni, an active representative of the Jadid movement that emerged in the early twentieth century, devoted his life to enlightening the nation, educating children, and raising a generation of knowledgeable, socially responsible individuals. His activities were directed toward the formation of educated specialists and the aspiration for a free and prosperous homeland. The Uzbek people possess a rich historical, spiritual, and cultural heritage shaped over centuries. The legacy left by prominent enlightened thinkers continues to serve as a guiding framework for contemporary education. In this regard, the scientific and pedagogical heritage of Abdulla Avloni holds particular significance. His works are distinguished by their strong educational and moral orientation and remain relevant for the preparation of future history teachers in modern educational practice.

LITERATURE ANALYSIS AND METHODS

In the course of the research, the Law on Education of the Republic of Uzbekistan, the works of President Shavkat Mirziyoyev, scholarly literature related to the topic, and relevant

Internet sources were analyzed. The study employed general scientific research methods, including theoretical analysis, deduction, analysis and synthesis, and logical reasoning.

DISCUSSION AND RESULTS

Abdulla Avloni is one of the prominent figures of Uzbek national culture of the late nineteenth and early twentieth centuries. He was an enlightened poet, playwright, journalist, pedagogue, scholar, and public figure who played a significant role during the period of profound cultural and social change in Turkestan. As an active representative of the Jadid movement, Avloni advanced progressive ideas aimed at national awakening and enlightenment, considering education as the main driving force of social development. Throughout his career, Abdulla Avloni worked as a teacher and pedagogue, laying the foundations of modern Uzbek pedagogy and the methodology of teaching the Uzbek language and literature. His educational ideas are distinguished by their deep moral and spiritual content. The importance he attached to knowledge and enlightenment is clearly reflected in his poetic works. For example, in the following lines, Avloni expresses his devotion to science and learning:

The son of man is perfected through knowledge, Beauty and wealth are insufficient without it. Knowledge is a necessary light, like a burning candle, to know God without knowledge is a meaningless proverb [4]. Through these lines, Avloni emphasizes that knowledge is the main source of human perfection and moral maturity. He compares knowledge to vital necessities, such as food, water, and air, showing that intellectual and spiritual development is impossible without learning. According to Avloni, ignorance deprives a person of true understanding, while knowledge illuminates both the individual and society. This idea remains relevant today, as lack of education often leads to social and moral problems.

President of the Republic of Uzbekistan Shavkat Mirziyoyev has also highlighted the contemporary significance of Avloni's legacy, noting that the work *"Turkish Gulistan or Ethics"*, created on the basis of centuries-old national values, has not lost its importance as a unique guide to moral education. The President emphasizes that Avloni's educational and ethical ideas are especially valuable in the modern period, when national spirituality understanding is being restored. In addition, works such as *"The First Teacher," "The Second Teacher,"* and *"Tarihi Anbiyo"* play an important role in the moral and intellectual education of the younger generation.

Abdulla Avloni (1878–1934) devoted his life to spreading progressive ideas through education. In 1904, he opened a new-method (Jadid) school in the Mirabad district of Tashkent, where secular subjects such as native language, literature, geography, history, arithmetic, and natural sciences were taught alongside moral education. In 1909, he established the charitable organization *"Jamiyati Hayriya"*, which provided financial support for the education of children from low-income families and orphans [7;8.]. Later, in 1912, he opened a two-grade school in the Degrez district of Tashkent. Avloni authored and published numerous textbooks and manuals for new-method schools, including *"The First Teacher"* (1911), *"The Second Teacher"* (1912), *"Turkish Gulistan or Ethics"* (1913), *"School Gulistan"* (1915), and collections such as *"Literature and National Poems"* (1909–1915).

These works played a crucial role in shaping the content and methodology of national education. From 1921 onward, Abdulla Avloni actively participated in teacher training, women's education, and the development of educational institutions. He held various positions, including head of educational institutions, teacher at the Tashkent Military School, and professor and head of the language and literature department at the Central Asian University. His scientific and

creative heritage includes textbooks, dramas, critical articles, and thousands of poetic lines written under various pseudonyms.

Historically, education in Turkestan during the nineteenth century was largely limited to religious instruction in mosques and madrasas. With the emergence of colonial educational policies, secular knowledge was introduced, but often in a bureaucratic and ideologically biased manner. In response, Avloni sought to create a national model of education that combined universal human values with national identity. Reflecting on this struggle, he wrote: “When ignorant people learned that I taught about the earth, people, mountains, rivers, and the sky in my school, they accused me of unbelief and closed the school” [6]. Despite such resistance, Abdulla Avloni remained committed to his educational mission and continued promoting enlightenment. His pedagogical heritage demonstrates strong potential for teaching Jadid scientific heritage to future history teachers by integrating moral education, national values, and modern scientific knowledge. Although the Russian authorities attempted to suppress modern schools, Avloni later opened a two-grade school in the Degrez district of Tashkent, where geography, history, arithmetic, geometry, natural sciences (physics), as well as native language and literature were taught [9]. His textbooks combined writing instruction with short didactic texts designed to develop reading comprehension and moral education.

MAIN PART

As an active and nationally oriented participant of the Jadid movement, Abdulla Avloni created numerous artistic and journalistic works aimed at improving the literacy of children in the Turkestan region and developing their spiritual and moral worldview. In the *usuli jadid* schools that he established, including those opened in his own home, Avloni prepared and used such educational resources as *“Literature or National Poems,” “The First Teacher,” “The Second Teacher,” “School Gulistan,”* and *“Turkish Gulistan or Morals.”* These textbooks were not limited to teaching basic reading and writing skills. They played an important role in shaping students’ independent thinking, goal-setting abilities, and moral consciousness. Avloni clearly understood the pedagogical value of artistic creativity in developing children’s imaginative and critical thinking. In a period when national identity and spiritual maturity were under ideological pressure, such an approach was especially significant.

Historical experience shows that expressive reading is one of the key objectives of literary education, as it enables learners to comprehend the content and meaning of a literary text more deeply. Through expressive and meaningful reading, the events and ideas of a work come vividly before the reader. Avloni paid equal attention to literacy, reading comprehension, and emotional perception of artistic texts, considering them essential components of effective education. It is well known from pedagogical history that teaching children expressive reading is one of the main tasks of literary education. Expressive reading ensures a deeper understanding of a literary text, allowing the content, images, and events of a work to vividly appear before the reader. Abdulla Avloni attached equal importance to literacy and to reading comprehension, emphasizing the emotional perception and aesthetic appreciation of artistic works as essential components of education [11].

Abdulla Avloni also paid special attention to the education of socially vulnerable children, particularly orphans in need of protection. In 1909, under his leadership, the charitable organization *“Jamiyati Khairiya”* was established to educate orphaned children. Later, he opened a two-grade school in the Degrez district of Tashkent, where secular subjects were taught. Despite resistance from the colonial authorities, Avloni continued his educational activities without abandoning his progressive views. In 1913, he actively participated in the establishment of the

"Turon" theater troupe, aiming to protect society from harmful external influences and to strengthen national consciousness. By translating foreign literary works into Uzbek and staging them, he contributed to the spiritual development of society through national theatrical art.

According to Abdulla Avloni, moral education is the most important factor that elevates a person's dignity and social status. He divided human behavior into good and bad, explaining that disciplined behavior formed through education leads to virtue, while the absence of upbringing results in immoral conduct. He described ethics as a science that explains good and bad behavior through evidence and examples, emphasizing that a morally educated person understands personal responsibility, values knowledge and scholars, and strives for self-improvement. He cited the hadith stating that no deed weighs heavier than good character, as righteous behavior elevates a believer to a high spiritual rank. Avloni further emphasized that a human being consists of two interconnected elements: the body and the soul [10].

While the body perceives the external world, the soul distinguishes good from evil. Moral character, which reflects the state of the soul, cannot be seen with the eye but is measured through behavior. He argued that expecting virtue from a person raised without education and morals is unrealistic, comparing it to seeking fruit from barren land. A rich scientific and pedagogical heritage of spiritual and moral education has been passed down from Abdulla Avloni. In modern pedagogical research, his poems and stories should be studied in higher education institutions as effective tools for students' spiritual and moral development. This heritage can be systematically applied through the following educational directions:

As folk wisdom states, *"It is better to be a shepherd in one's own homeland than a sultan in a foreign land"* [10]. This idea of devotion to the homeland is deeply reflected in Abdulla Avloni's poetic works: I am not guilty, my homeland, my mountains, I left you too early, my dear gardens. Separation torments my soul, My days are filled with sorrow. Avloni's work *"Turkish Gulistan or Morality,"* which he described as intended for older children, is regarded as a model educational text. The author noted that he wrote this work under the influence of the Persian poet Saadi Shirazi's *"Gulistan."* Avloni explained his motivation as follows: *"Encouraged by the requests of several fellow teachers, I found the courage and enthusiasm to write and publish this work. Praise be to God, I succeeded on my second attempt, because schools in Turkestan are in great need of a perfect ethical book written in our own language (Uzbek), including teachers themselves"* [5].

Avloni emphasized that *"Turkish Gulistan or Morality"* was prepared for literature enthusiasts, ethical scholars, and for use in upper grades of the first new-method schools. The emotional depth of his concern for the nation is expressed in the following lines: *Every day until evening I grieve, Every night my inner fire burns. No one knows my pain, Why is my nation ill?* The effectiveness of Avloni's poems *"Vatan"* and *"The Word of Hijran"* is explained by several factors: these poems were written specifically for students; they correspond to learners' age, worldview, and intellectual level; their content is conveyed in clear and fluent language; and despite being written nearly a century ago, they remain relevant to modern literary language. Avloni's patriotic poems and stories glorifying the homeland possess significant social and pedagogical value in studying early twentieth-century educational thought. Their potential in fostering patriotism within the educational system remains highly effective.

A separate chapter of *"Turkish Gulistan or Morality"* entitled *"Munislik"* is devoted to educating students in the spirit of friendship and companionship. In this chapter, *munislik* is defined as finding one's equal, sharing wealth, and enjoying sincere communication with loyal

friends. Avloni distinguishes between true and false friends, teaching students to recognize sincerity, avoid hypocrisy, and distance themselves from deceitful companionship. In his pedagogical practice, Avloni effectively employed the storytelling method, drawing on Eastern—particularly Uzbek—folk traditions, classical Eastern poetry, and examples from Hadith literature. He frequently used poetic narratives to convey moral lessons. In the chapter *"Munislik,"* the following poem is presented in a narrative form [10]: *A true friend forgives his friend, Words spoken face to face. A false friend has a thousand tongues, Striking from behind with hidden words.*

Across nearly all his textbooks, Abdulla Avloni consistently emphasized the development of friendship and solidarity among students. Examples include the stories *"The Alliance"* in *"The First Teacher," "False Friend"* and *"The Bear's Friendship"* in *"The Second Teacher,"* as well as *"Goodness Does Not Remain in the Ground," "The Lion and the Bear," "The Rooster and the Wolf," "Ahmed and His Father,"* and *"The Blind and the Lame."* Through these works, Avloni addressed the moral value of friendship and companionship as essential components of ethical education.

The method of cultivating honesty: One of the characteristic traditions of the Uzbek mentality is the special attention given to cultivating honesty in the younger generation. In the pedagogical and creative legacy of Abdulla Avloni, poems and stories promoting truthful speech and righteous behavior occupy an important place. A clear example of this is the poem *"The Lying Shepherd,"* written specifically for children. Abdulla Avloni defines truthfulness and correct speech as follows: *"Haqqaniyat means correctness in actions and truthfulness in words. By following the path of truth, a person cultivates a garden of health and a flower garden of happiness. Truth is the mother of such noble qualities as compassion, righteousness, and justice, which form the foundation of humanity."* According to Avloni, truthfulness is manifested in two forms: truthfulness in actions and truthfulness in words. A person guided by intellect and conscience always speaks what he knows and sees, that is, the truth and what is right [10].

Honesty in action implies not betraying another person's dignity or property, while honesty in speech means always telling the truth. An intelligent and conscientious individual consistently follows these principles. Avloni emphasizes that the opposite of honesty is lying, which he defines using the term *kizb* and describes liars as morally weak individuals [10]. He considered it one of the most sacred human duties to raise children in a way that prevents lying from becoming a habit and to protect their speech from moral vices. Avloni's poems vividly illustrate the destructive consequences of dishonesty, warning that false reputation and deceit lead to lasting moral damage. His works demonstrate strong artistic and pedagogical influence drawn from folk traditions. Under the influence of folklore, Avloni composed several didactic poems, among which *"The Lying Shepherd"* can be effectively used in primary education to instill honesty through storytelling and moral reflection.

The method of cultivating patience and contentment: Patience and contentment occupy a central place in Abdulla Avloni's pedagogical legacy. Numerous poems and stories devoted to these virtues are found in his works, particularly the chapter *"Patience"* in *"Turkish Gulistan or Morality,"* as well as stories such as *"Taqsim," "Greed,"* and *"The Lion and the Bear"* from *"The First Teacher."* Avloni defines patience as *"the ability to endure the hardships and misfortunes that befall a person,"* emphasizing that calmness and perseverance are essential in every endeavor [10]. According to him, patience enables individuals to achieve their goals thoughtfully and peacefully, while haste often leads to failure. Through these ideas, Avloni highlights patience and contentment as fundamental moral qualities necessary for personal growth and social harmony.

Everyone should act with patience and calmness in every undertaking. If a person works with patience, perseverance, and contentment, he will achieve his goal peacefully and steadily and gain satisfaction from his efforts. On the contrary, haste makes it difficult to reach one's goal. In the chapter *"Patience,"* Abdulla Avloni advances morally significant ideas of self-control and contentment.

Abdulla Avloni's poems calling for knowledge and enlightenment, as well as the chapters *"Aqsami ilm," "Fatonat," "Hifzi lisan," "Ignorance,"* and *"Haqqaniyyat,"* address these issues in detail. According to Avloni, knowledge means the ability to read and write well and to master all the essential skills and sciences necessary for life. He believed that the future and progress of a nation depend on the level of knowledge, enlightenment, craftsmanship, and cultural development attained by its youth. Poems promoting knowledge and enlightenment occupy an important place in Avloni's pedagogical and scholarly heritage.

It should be noted that most of the poems included in the collection *"Literature or National Poems"* can be effectively used for the spiritual and moral education of students. Abdulla Avloni authored numerous poems and stories devoted to science and enlightenment that are valuable for students' moral development. Particularly noteworthy are works such as *"School," "A View from Our Environment," "My Dreams of the Future," "Promoting the School," "Happiness Exists,"* and *"Ignorance,"* as well as texts from *"The Second Teacher,"* including *"School," "Kindergarten," "Call to School," "The Scourge of Ignorance," "Schoolboy," "From the Language of a Lazy Student,"* and *"Lazy."*

The educational effectiveness of these works is explained by several factors: they are written in clear and simple language appropriate to students' age and level of understanding; they emphasize the importance of literacy, education, and intellectual development of the younger generation; they reflect national customs, traditions, and values in discussions of knowledge and enlightenment; they widely employ Islamic intellectual heritage that encourages learning; they are based on Uzbek folk pedagogy; they are influenced by the rich pedagogical and philosophical traditions of Eastern wisdom. Avloni emphasized the value of knowledge in the following words: *"Knowledge is a very high and sacred quality for a person. It reflects our actions and condition like a mirror and sharpens the mind like a sword. It distinguishes good from evil, right from wrong, and purity from impurity. Knowledge saves us from the darkness of ignorance, leads us to the world of culture, humanity, and enlightenment, and guides us away from immoral deeds"* [4].

Abdulla Avloni also wrote many poems and stories encouraging respect for parents. Notable examples include *"The Time of Education"* and *"Obedience"* from *"Turkish Gulistan or Morality,"* as well as *"Family Debate," "Workers' Song," "A Mother's Words to Her Son," "A Son's Words to His Mother,"* and *"Words to One's Wife"* from *"Literature or National Poems."* In *"The Second Teacher,"* stories such as *"The Wise Gardener," "Ahmad and His Father,"* and *"Soqi and His Mother"* further emphasize this theme. In the chapter *"Obedience"* of *"Turkish Gulistan or Morality,"* Avloni defines obedience as one of the highest human virtues, stating that respect for parents, teachers, and elders is a fundamental moral quality [10]. The poem *"Family Debate"* portrays a conflict between an educated, forward-looking father and an ignorant mother who resists education, highlighting the importance of knowledge.

Similarly, *"Workers' Song"* conveys meaningful ideas about honoring parents. Generosity is another deeply rooted value in Uzbek culture. Abdulla Avloni devoted several poems and stories to this virtue, including the story *"Generosity"* from *"The Second Teacher."* In *"Turkish Gulistan or Morality,"* he describes generosity as a noble human quality and contrasts it with greed, which

he considers morally destructive [10]. Through vivid examples, Avloni demonstrates that generosity brings social harmony, while miserliness leads to spiritual poverty. In conclusion, the spiritual and moral education of students through the scientific, pedagogical, and artistic heritage of Abdulla Avloni represents one of the most effective approaches within the modern educational system.

According to historical sources, Abdulla Avloni played a significant role not only in the development of education and culture of the Uzbek people, but also in the social and political life of neighboring Afghanistan. For a certain period, he served as the Minister of Public Education of Afghanistan and later worked as the Consul of the Soviet Union in Afghanistan [12]. This demonstrates that Avloni was not only a patriot and national figure, but also a prominent enlightener who actively promoted universal human values beyond national boundaries. Avloni viewed education as the main means of achieving future freedom and national liberation. He firmly believed that by educating the younger generation, it was possible to raise independent thinkers who would take responsibility for the fate of their country and society. He envisioned his students as individuals with their own civic position, capable of contributing to the progress of the nation. The realization of these ideals can be clearly observed today in the image of New Uzbekistan, which is undergoing profound renewal and transformation in the years of independence. Just as Jadid schools once represented a “new method” in education, contemporary reforms continue this innovative path based on new approaches to national development.

On August 3, 2017, the President of the Republic of Uzbekistan, Shavkat Mirziyoyev, held a meeting with representatives of the country’s creative intelligentsia, during which key issues in the fields of culture and art were discussed. The meeting emphasized the need for large-scale reforms in culture, mass media, literature, and art, as well as the importance of supporting young talents and introducing new ideas and initiatives. At the meeting, the President stated: *“There is another extremely important issue that never leaves our agenda, and it is directly related to the upbringing of our young generation, our children. As our great ancestor Abdulla Avloni said, this matter is truly a question of life or death for us, of salvation or destruction, of happiness or disaster”* [2]. In this context, Abdulla Avloni’s views on education are closely connected with the mentality, way of life, and national values of the Uzbek people. His pedagogical heritage serves as a foundation for a national model of education and remains a valuable source for educating spiritually mature, socially responsible, and intellectually developed young people.

CONCLUSIONS AND SUGGESTIONS

In conclusion, it can be stated that Abdulla Avloni’s pedagogical activity played a crucial role in the fundamental renewal of public education at the beginning of the twentieth century. His work on creating textbooks, teaching manuals, and methodological resources laid a strong foundation for modern national education prior to the October Revolution. Avloni regarded education as the main means of social progress and national development.

In August 1917, Abdulla Avloni participated in the Second All-Russian Congress of Muslim Teachers held in Kazan. In the same year, together with Munavvarqori Abdurashidkhan, he took part in the establishment of the *“Teachers’ Society”* in Tashkent. The main purpose of this organization was to send talented young people to advanced foreign higher education institutions and to prepare progressive, nationally conscious specialists for higher educational institutions that were planned to be established in Turkestan. These initiatives reflect Avloni’s strategic vision of forming a modern, educated national elite. Although Avloni initially placed certain hopes on the reforms of the Tsarist government, its inconsistent and restrictive policies soon became evident.

Nevertheless, he did not abandon his educational mission and continued his pedagogical and enlightenment activities throughout the 1920s.

From 1930, he worked as a professor and head of the Uzbek language and literature department at the Faculty of Pedagogy of the Central Asian State University (now the National University of Uzbekistan), contributing significantly to higher education and teacher training. Avloni's school textbooks are of particular importance in the development of students' speech, expressive reading, and artistic thinking through dialogic and conversational teaching methods. For the first time, he included works by prominent writers such as M. Gorky, V. Mayakovsky, G'. G'ulom, H. Olimjon, Oybek, K. Yashin, and Uyg'un in school curricula, providing students with systematic knowledge of their lives and creative activities. This approach demonstrates Avloni's understanding of literature as a powerful tool for moral, intellectual, and aesthetic education.

Conclusion

Throughout his life, Abdulla Avloni devoted his conscious activity to public education and enlightenment. His pedagogical views, grounded in national values and universal human ideals, remain relevant today. The study of Avloni's educational heritage offers significant pedagogical potential for teaching Jadid scientific heritage and for preparing future history teachers who are intellectually independent, morally mature, and socially responsible. Suggestions: To actively incorporate Abdulla Avloni's pedagogical ideas and texts into the curricula of higher education institutions that train future history teachers. To use Avloni's works as a source for developing students' moral education, critical thinking, and national consciousness. To apply Avloni's dialogic and literary-based teaching methods in modern history and social science education. To conduct further interdisciplinary research on Avloni's pedagogical heritage in the context of contemporary educational reforms.

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CONDUCTING EXPERIMENTS AND TESTS ON TEACHING THE SUBJECT OF CALCULATION METHODS THROUGH SOFTWARE-METHODICAL COMPLEXES AND ANALYSIS OF THE RESULTS

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Abstract. *The aim of this article is to improve the methodology of independent mastering of the subject of Calculation Methods by students through software and methodological complexes. In this experiment, test work was conducted on students of Namangan State University, Andijan State University and Gulistan State University, and it was found that the results of the students in the experiment increased by 11.9 percent compared to the results before the experiment.*

Keywords: *software and methodological complex, Calculation methods, independent learning.*

INTRODUCTION

Experimental and testing work was conducted to determine the effectiveness of our educational content developed for the mathematics program of higher education institutions and the " Calculation methods " course. The experimental work was carried out at Namangan State University, Gulistan State University, and Andijan State University in 2023-2026. A total of 526 students participated in the experimental work.

The experimental work was carried out in three stages:

1. Preparatory stage: 2023-2024 academic year.
2. Main stage: 2024-2025 academic year.
3. Final stage: 2025-2026 academic year.

Preparatory stage - at this stage, the relevance, goal, objectives, and object of the research were determined, the scientific, theoretical, and methodological foundations of the research problem were studied, the use of modern information and communication tools in the teaching and learning process of the "Computational Methods" course, and the creation of an information and educational environment were analyzed. The purpose of the experimental preparatory stage of the research work was to determine the level of use of modern information and communication technology tools in teaching the "Computational Methods" course taught in the mathematics department of universities, as well as the current state of teaching the "Computational Methods" course.

At the main stage, a software and methodological complex for the course "Methods of Calculation" taught in the mathematics department of universities was created, and the mathematics and applied mathematics departments of Namangan State University, Gulistan State University and Andijan State University were selected as experimental and testing sites, and experimental and testing work was carried out. Also, methodological instructions and textbooks

created for students to study the course "Methods of Calculation" were distributed. With the help of the experimental and testing work, the knowledge levels of students were determined.

The final stage - at this stage, work was carried out to edit the methodology developed to increase the effectiveness of the lesson in teaching the "Computational Methods" course through the software-methodical complex. The results of the pedagogical pilot-testing work on the use of the developed software-methodical complex and teaching the "Computational Methods" course were summarized, the conclusions were verified in practice, the results and materials obtained were systematized in accordance with the goals and objectives of the research.

Information about the experimental and control groups and the number of students

№	Objects of experience	Groups	Number of students	Total
1	Namangan State University	Experimental group	133	251
		Control group	118	
2	Andijan State University	Experimental group	92	184
		Control group	92	
3	Gulistan State University	Experimental group	46	91
		Control group	45	
4	Total	Experimental group	271	526
		Control group	255	

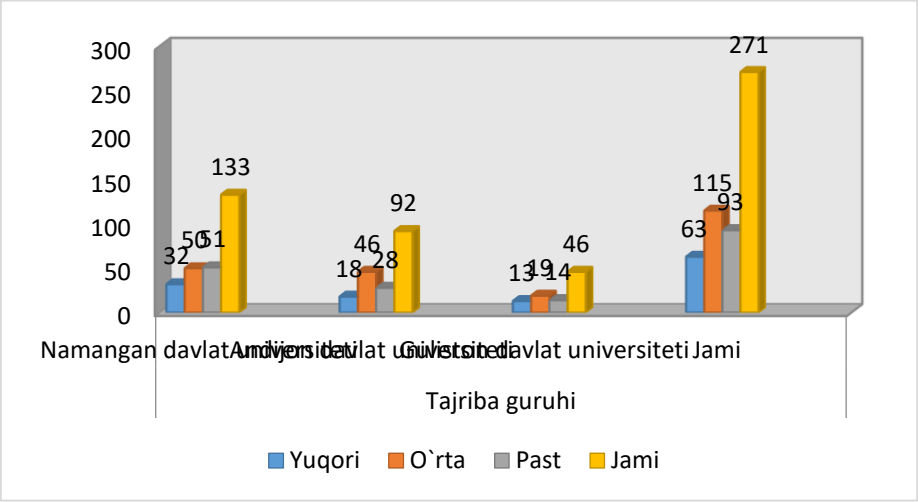
RESULTS

Experiment – results of test work and statistical analysis

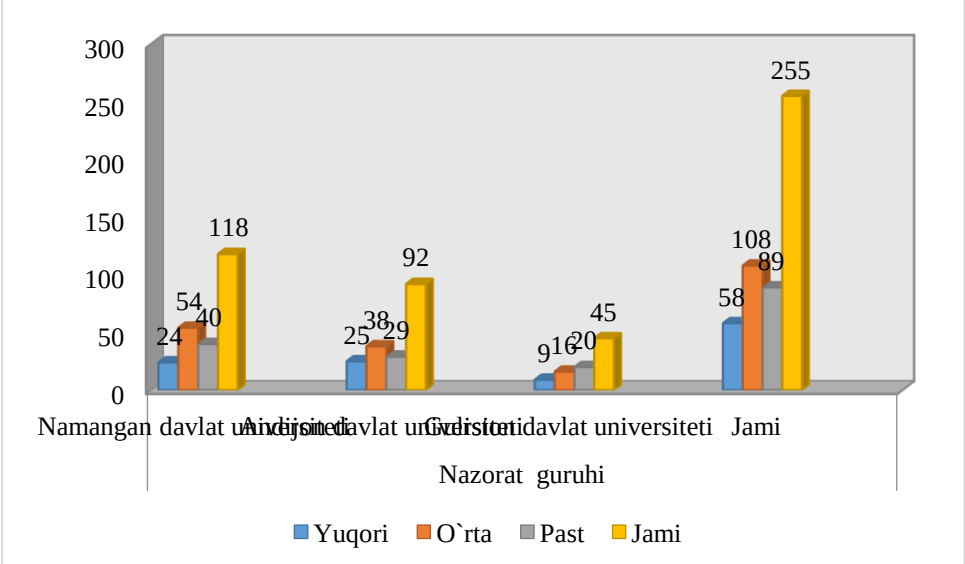
Comparative table of statistical data from the experiment (among universities) on the development of pedagogical activity by improving the methodology of independent mastery of the subject of computational methods by students through software and methodological complexes.

Comparative table of statistical data before the experiment (by HEIs)

№	An object of experience	High	Medium	Low	Total
Experimental group	Namangan State University	32	50	51	133
	Andijan State University	18	46	28	92
	Gulistan State University	13	19	14	46
	Total	63	115	93	271

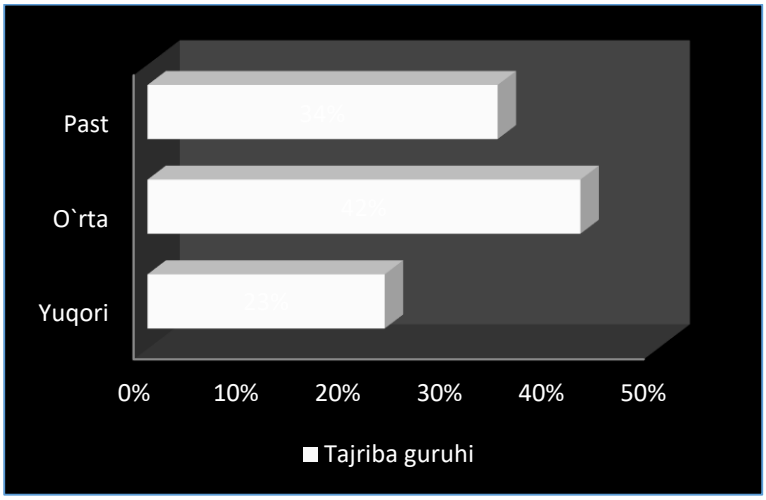


Comparative table of statistical data before the experiment (by HEIs)					
№	An object of experience	High	Medium	Low	Total
Control group	Namangan State University	24	54	40	118
	Andijan State University	25	38	29	92
	Gulistan State University	9	16	20	45
	Total	58	108	89	255

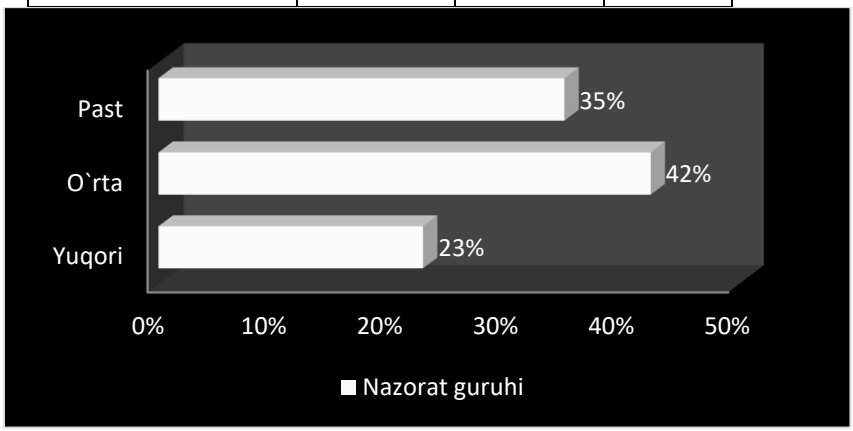


Now let's calculate these in percentage terms:

№	High	Medium	Low
Experimental group	23%	42%	34%

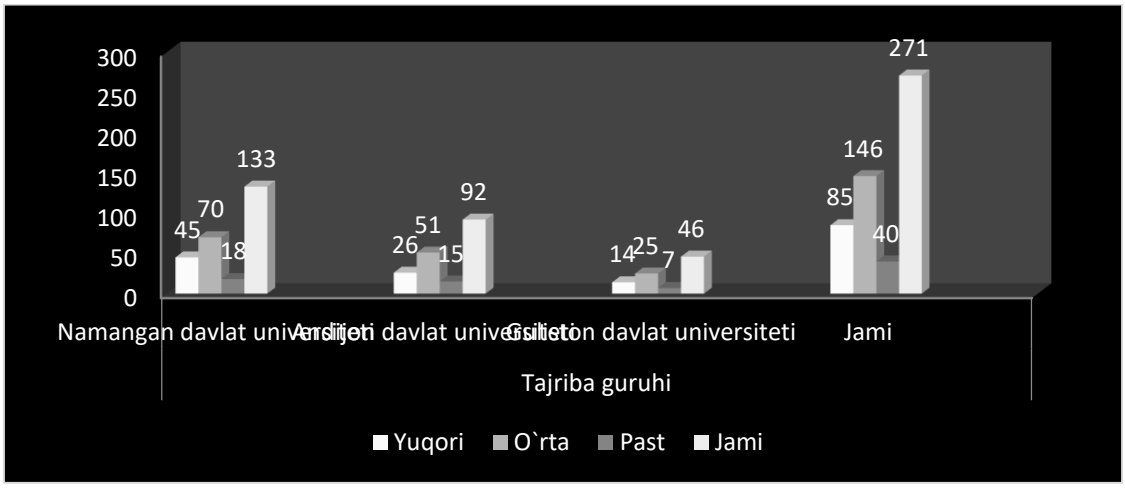


№	High	Medium	Low
Control group	23%	42%	35%



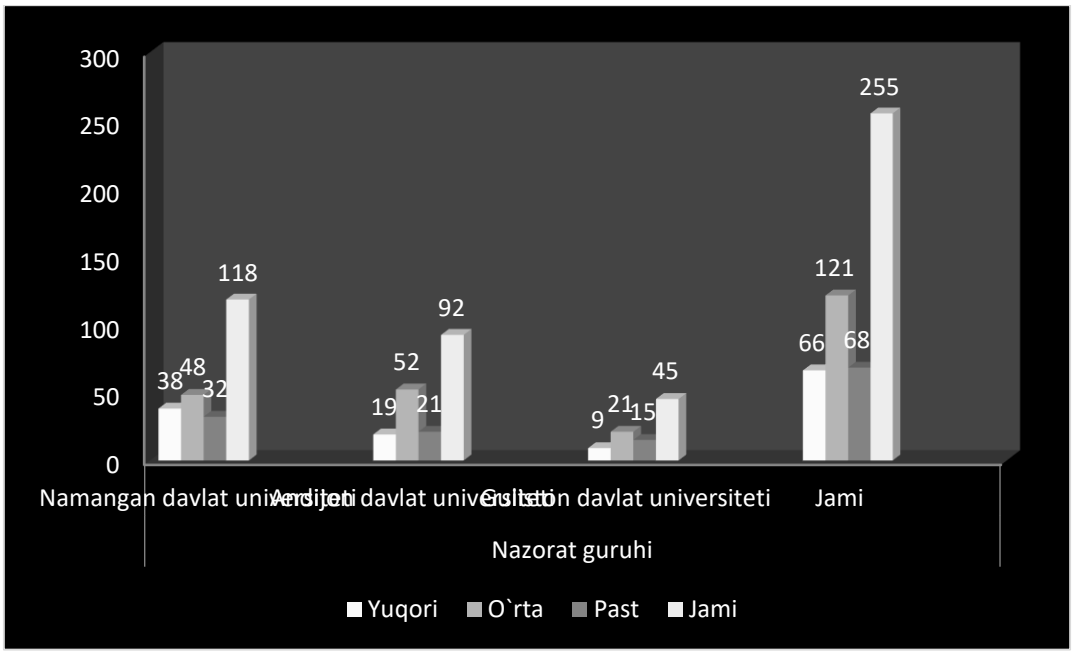
Comparative table of statistical data after the experiment on the development of pedagogical activity by improving the methodology of independent mastery of the subject of Computational Methods by students through software-methodological complexes (by universities).

Comparative table of statistical data after the experiment (by HEIs)					
№	An object of experience	High	Medium	Low	Total
Experimental group	Namangan State University	45	70	18	133
	Andijan State University	26	51	15	92
	Gulistan State University	14	25	7	46
	Total	85	146	40	271



Comparative table of statistical data after the experiment (by HEIs)

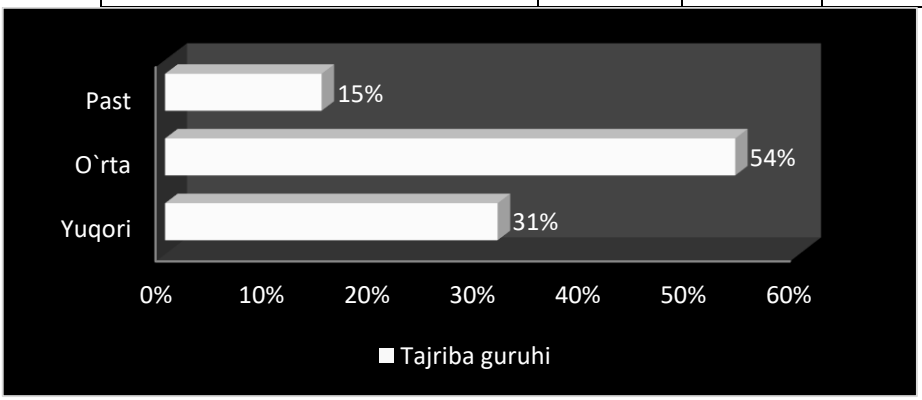
T/R	An object of experience	High	Medium	Low	Total
Control group	Namangan State University	38	48	32	118
	Andijan State University	19	52	21	92
	Gulistan State University	9	21	15	45
	Total	66	121	68	255



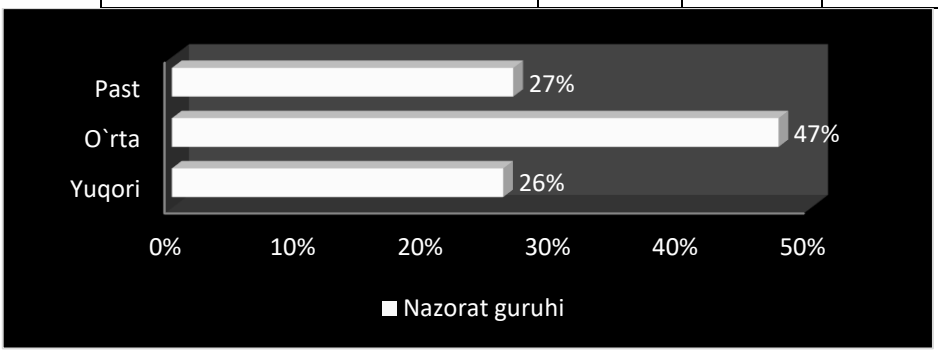
Now let's calculate these in percentage terms:

№	High	Medium	Low

Experimental group	31%	54%	15%



№	High	Mediu m	Low
Control group	26%	47%	27%



Comparative table of statistical data before the experiment (by HEIs)

Experimental group	5(High)	4(Medium)	3(Low)	Total
	63	115	93	n1=271

Number of students in the experimental group with the quality indicator Quality =63+115= 178 people, we find them in percentage: $x = \frac{Quality*100\%}{n1} = \frac{178*100\%}{271} = 65{,}6\%$

Control group	5(High)	4(Medium)	3(Low)	Total
	58	108	89	n2=255

Number of students in the control group with the quality indicator Quality =58+108=166 people, we find them in percentage: $x = \frac{Quality*100\%}{n2} = \frac{166*100\%}{255} = 65{,}1\%$

So, the quality improvement in the experimental and control groups before the experiment is (65.6-65.1) = 0.5%.

Comparative table of statistical data after the experiment (by HEIs)

Experimental group	5(High)	4(Medium)	3(Low)	Total
	85	146	40	m1=271

Number of students in the experimental group with the quality indicator Quality =85+146=231 people, we find them in percentage: $x = \frac{Quality*100\%}{m1} = \frac{231*100\%}{271} = 85{,}2\%$

Control group	5(Yuqori)	4(O`rta)	3(Past)	Jami
	66	121	68	m2=255

Number of students in the control group with the quality indicator Quality =66+121=187 people, we find them in percentage: $x = \frac{Quality*100\%}{m2} = \frac{187*100\%}{255} = 73{,}3\%$

So, the quality improvement in the experimental and control groups at the end of the experiment is (85.2-73.3) = 11.9%. This in turn means that the experimental and control groups are 11.9% more successful at the end of the experiment.

Comparison table of quality indicators before and after the experiment

Experimental group	
At the beginning of the experiment	65.6
After the experiment	85.2
Control group	
At the beginning of the experiment	65.1
After the experiment	73.3

Pedagogical experience - the effectiveness of test results is 11.9% higherx_i square $(x|\ \ |2)$ proved based on the criterion. Therefore, the average learning of students in the experimental group increased compared to the control group. In this case, we divide the students in the experimental and control groups into three categories:

- i=1 category – students who received a high (“5”) grade;
- i=2 category – students who received an average (“4”) grade;
- i=3 category – students who received a low (“3”) grade;

We introduce the following definitions by category:

- O_{1i} – the frequency of students in the experimental group who received grade i;
- O_{2i} – the frequency of students in the test group who received grade i;
- P_{1i} – the probability that a student randomly selected from the experimental group will receive grade i;
- P_{2i} – the probability that a student randomly selected from the test group will receive grade i;
- P_{1i} va P_{2i} The following hypotheses can be expressed through:
- $H_0 : P_{1i} = P_{2i}$ i=1,2,3;

$H_1 : P_{1i} \neq P_{2i}$ at least for some i=1,2,3.

If n_1 students participated in the experimental group and n_2 students participated in the control group, then the following random variable is taken as the test sample:

$$T = \frac{1}{n_1 n_2} \sum_{i=1}^{3} \frac{(n_1 * O_{2i} - n_2 * O_{1i})^2}{O_{1i} + O_{2i}}$$

T random variable degrees of freedom $\vartheta = 2$ was x^2 has a distribution function. H_0 The rule for testing the hypothesis is as follows:

- - Based on the data, the observed value of the T statistic is determined, which $T_{observe}$ defined as;

- $\alpha = 0{,}05 and \vartheta = 2$ degree of freedom x^2 from the distribution table T_{kr} =1.67 we find.
- If $T_{observe} < T_{kr}$ If so, the alternative hypothesis N_0 is accepted, otherwise α in terms of value N_0 is rejected and N_1 The alternative hypothesis is accepted.

If, based on the results of the experiments, hypothesis N_1 turns out to be correct, then it means that the experimental lessons conducted based on a special methodology have yielded results. According to the hypothesis testing rule, critical values are compared with the observed value of the criterion and calculations are performed based on the table.

The observed value of T at the beginning of the experiment is determined.

$$T_{observe} = \frac{1}{n_1 n_2} \sum_{i=1}^{3} \frac{(n_1 * O_{2i} - n_2 * O_{1i})^2}{O_{1i} + O_{2i}} \approx 1$$

X^2 from the table of critical points of the distribution $\alpha = 0{,}05 va \vartheta = 2$ based on T_{kr}=1.67 we define . According to the rule $T_{observe} < T_{kr}$ Since H_0 is the hypothesis, that is, there is no difference in the selected groups, is accepted.

The observed value of T at the end of the experiment is determined.

$$T_{observe} = \frac{1}{n_1 n_2} \sum_{i=1}^{3} \frac{(n_1 * O_{2i} - n_2 * O_{1i})^2}{O_{1i} + O_{2i}} \approx 11{,}9$$

X^2 from the table of critical points of the distribution $\alpha = 0{,}05 va \vartheta = 2$ based on T_{kr}=1.67 we define. According to the rule $T_{observe} < T_{kr}$ Therefore, the hypothesis N_0 is rejected, which means that the hypothesis H_1 is accepted. This means that, as we said above, the experimental testing is working. Pedagogical experience - the effectiveness of test results is 11.9% higherx_i square$(x| \ \ |2)$ proved based on the criterion. In conclusion, the experimental and test work carried out to develop the pedagogical activity of students by improving the methodology for independent mastering of the subject of Computational Methods through software and methodological complexes shows that they have yielded effective results.

CONCLUSIONS

In conclusion, in order to determine the level of effectiveness of the educational content of the software-methodological complex for the mathematics direction and the course "Methods of Calculation", the stages of organizing pedagogical experimental-test work and the work carried out at these stages were analyzed. Based on the above, the problems raised in the scientific research work showed the correctness of the hypothesis and the effectiveness of the solutions to the tasks set. The effectiveness of students' mastery was determined in the following:

- The use of multimedia technology increased students' interest in learning;
- The opportunity to master lectures and practical exercises together showed that students developed their knowledge and skills;
- Mastering the course on the basis of interactivity activated students' thinking abilities and increased the efficiency of mastering educational material;
- Conditions were created for students to quickly complete tasks such as reading, independent familiarization with educational materials, and analysis of information.

Mathematical statistical methods were used to determine the effectiveness of software and methodological complexes for the mathematics department of higher education institutions and the course "Computational Methods". After conducting an experimental test using traditional and remote methods, it was found that the indicators obtained in the experimental test group were higher than in the control group.

RECOMMENDATIONS

- It is necessary to widely introduce teaching methods using network technology in all areas of higher education institutions through a software-methodological complex;

- The software-methodological complex should include video lectures by leading and well-known specialists of leading higher education institutions in the subject "Computational Methods" and disciplines related to the field of mathematics;

- The results of the research can be used in all areas where the subject "Computational Methods" is taught, and other courses can be organized using the software-methodological complex.

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PROFESSIONAL STANDARD OF GENERAL SECONDARY EDUCATION TEACHERS: COMPONENT ANALYSIS AND PROFESSIONAL REQUIREMENTS

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Abstract. *The professional standard for secondary school teachers is a set of requirements aimed at enhancing the quality of education, continuously developing teachers' professional competencies and ensuring the effectiveness of the educational process. This article analytically examines the methodological foundations of the professional standard for general secondary education teachers, the sections and areas included in the standard, as well as the system of criteria for professional activities. Moreover, the mechanisms by which the professional standard influences students' educational outcomes and its practical significance are elucidated. The indicators defined for certain areas of the standard are interpreted based on the author's explanations, and suggestions and recommendations for their effective application in educational practice are presented.*

Keywords: *teacher, standard, field, criterion, indicator, quality of education, professional competence, pedagogical process.*

INTRODUCTION. The growing societal demand for competitive personnel is creating conditions for the globalization of education. This, in turn, is leading to an increase in the workload and responsibilities placed on teachers. Such a situation necessitates not only the effective organization of pedagogical staff activities but also the need for independent professional development and continuous improvement of their competence level. In many developed countries, including our republic, the professional standard of a secondary school teacher (hereinafter - the professional standard) is a regulatory document introduced into practice as a basis for regulating the professional activity of a teacher in order to create a trajectory of professional development and correctly program their actions in this direction.

LITERATURE ANALYSIS AND METHODOLOGY. Professional standards are formed based on classification units and requirements that reflect social demand. Currently, countries worldwide are developing National Qualification Frameworks based on the “International Standard Classification of Education” (ISCED) [3]. This document eliminates the problematic situations that arise in the comparative assessment of achievements and the study of progress towards international goals due to the diversity of educational systems and programs of different countries. ISCED - adopted at the 36th session of the UNESCO General Conference in November 2011, is a conceptual document on the correct interpretation of the process occurring in education systems and its important aspects on a global scale, the classification and presentation of internationally comparable data.

The legal conceptual foundations for improving the spheres of education and science in our country, further strengthening respect for teachers and pedagogical workers in our society, promoting the development of their professional skills, in particular, assessing the results achieved by teachers with specific criteria, and organizing the activities of the national system in this regard are fully reflected in the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated May 15, 2020 No. 287 “On Measures to Organize the Activities of the National System for the Development of Professional Qualifications, Knowledge and Skills in the Republic of Uzbekistan” [2].

A professional standard is a standard that reflects the main labor functions and the conditions for their performance, defines the requirements for the level of skill, the content, quality, and conditions of labor, and serves as the main driving criterion in education. The professional standard of a teacher in Uzbekistan was developed by a working group of the Abdulla Avloni Research Institute for the Study of Problems and Forecasting the Prospects of Public Education with the support of the United Nations Children’s Fund (UNICEF) in Uzbekistan [4]. The experience of different countries was studied and international experts were involved in the development of the standard, extensive discussions were held among specialists in the field of education, and consultations were held with practical teachers. The professional standard is a document of a certain scope that reflects and defines the set of knowledge, skills, and personal qualities necessary for the formation of competencies of a modern teacher [1, 6, 8]. Based on the objective of our research, which focuses on the practical application of professional standards, we deemed it necessary to thoroughly examine the content of the areas covered by the newly implemented professional standard, analyze the tasks defined within it, and discuss its expected outcomes in detail.

ANALYSIS AND INTERPRETATION. Consequently, the framework of the professional standard of competencies of a teacher-teacher of a general education school has a specific structure and consists of such components as sections, the main goal of the type of activity, areas of competence or labor function, standards of competencies, indicators of the teacher's activity/labor actions. In particular, the 1st section, entitled "General Information", provides the types of activities [4], and in the methodological manual, which is presented as the main source for communicating the professional standard to teachers (as well as in the attached “Professional Standard”), the concepts of sections and related “labor tasks” are enriched with such concepts as “competence standard” and “field”. For example, analysis of the first section, titled “The Structure of Professional Standards: Social and Professional Competencies of Teachers”, which presents general information, reveals that it was developed based on a competency-based approach, and each requirement for teachers is aimed at expanding the scope of competencies [6]. Additionally, the use of concepts such as field, standard indicators, or competencies in the standard classification presented in the text is based on the document “Professional Standard for General Secondary School Teachers” appended to the manual.

According to its content, Section 2 of the professional standard defines the requirements for a teacher's social and professional competencies (job responsibilities), as well as the set of values they must adhere to in their professional activities. The document structure consists of professional competencies, professional knowledge, practical skills, and correspondingly: 7 areas of professional competencies, while Section 3 comprises 19 standards that represent their expansion, along with 65 indicators of work actions.

At this point, let us dwell a little on the social competencies and values of a teacher, because it is these qualities that guarantee their adaptation, readiness, and sense of responsibility to the requirements and obligations of learning and teaching in the constantly changing conditions of the 21st century.

In particular, the possession of skills, abilities to be active in social relations, the ability to communicate with subjects in professional activity [5] are social competencies in the individual, which, in our opinion, in relation to the activity of a teacher implies:

✓ the possibility of establishing relationships between all subjects of the educational process;

✓ the ability to create an atmosphere of interpersonal communication in various emotional states, communicativeness at the level of conflict resolution;

✓ validity in demonstrating one's civic position and using all possibilities in its formation in students;

✓ eloquence, correct use of the native language, etiquette, and cultural expression of opinions;

✓ the ability to understand local solidarity and collective unity among colleagues and students, and the capacity to implement cooperation for working in groups;

✓ dedication to consciously defining one's attitude towards educational goals and pedagogical, psychological, and methodological factors, encouraging the improvement of the quality of the school process through the method of positively influencing others in their activities.

The strengthening of social competence in a teacher is accompanied by the manifestation of values [8; p. 78] and values in the teacher differ in that they are oriented towards the student, possess personal and professional skills, and are a member of the school community.

- firstly, respect the dignity, personality, rights, freedoms, and emotions of students, regardless of their origin, religion, race, and social status. Ensure their expression as independent individuals, believe in their potential for development and success, recognize their individuality, and perceive the world, thoughts, and values from their perspective.
- secondly, adherence to universal and peculiar to the teaching profession principles, orientation towards the highest quality, activity in continuous improvement, innovation, integrability, adaptability to changes, analysis of acquired experience and introduction of innovations and changes into professional practice, understanding and approval of cultural diversity, justice and objectivity;
- thirdly, cooperation, jointly solving professional problems, responsibility for the educational, upbringing, and organizational development of the school, and having a place in the life of the school and the local community.

A broad coverage of the essence of the professional standard will become the basis for many studies on the professional development of teachers, and in this work, based on the topic, goals, and objectives of the conducted research, the 2nd section and the 6th section of the 3rd section of the professional standard are covered in more detail.

The second section is called "Management of the Educational and Upbringing Process" and covers five areas shown in the figure above [4].

First sphere. Planning the educational process - the teacher plans activities in this area within the framework of state educational standards and the curriculum; competence standards for the teacher's development of an educational and methodological complex (curriculum, lesson

plans, notes, didactic and handouts) in accordance with the curriculum and performance indicators/work actions related to each of them are defined:

- for a teacher to plan activities within the framework of state educational standards and curriculum, the following labor actions are necessary: - Develop curricula in accordance with the objectives of state educational standards and educational programs; adapt curricula based on students' needs and interests (if necessary); - Implement planning of their activities based on the principles of interdisciplinary correlation and integration;
- when developing an educational and methodological complex (lesson plan, notes, didactic materials) in accordance with the curriculum, the teacher: develops a lesson plan, taking into account the data obtained as a result of assessing students' knowledge, defining clear and measurable goals and results of the lesson; plans lesson forms and methods corresponding to the goals of the lesson, age characteristics and assimilation of students, the use of relevant educational, demonstration and handout materials; plans the integration of modern information technologies into the lesson process.

It is not by chance that the Concept for the Development of the Public Education System until 2030 highlights among the urgent tasks for teachers “mastering modern theories of teaching, understanding pedagogical psychology, and acquiring competency-based and personality-oriented approaches to education” and “creating modern forms of strategic planning in public education management, expanding the practice of utilizing innovative ideas, developments and technologies, and advanced achievements based on international experience in the field” [1].

Planning is a set of forms of regulation and management of socio-economic processes at various levels of the national economy [7; P. 370]. Based on this definition, planning is the most important professional competence of a teacher, relating to the entire activity of the teacher, which is the basis for the successful manifestation of other areas of competence. It is important not only for the orderly conduct of the educational process, but also in the personal and professional factors of self-development.

The teacher's methodological competence manifests itself in the planning of the educational process. The calendar-thematic plan for subjects is compiled and approved by authorized organizations, which means that the teacher knows the main goal and objectives of the plan, which is a good source for the teacher to plan the subject in detail. In particular, it is not enough to know the time distribution of topics for effective planning of one's activities in the educational process. Applying this procedure in various forms and types of lessons, and most importantly, clarifying the educational goal of each topic in the subject, defining tasks, correctly choosing necessary methods, and preparing answers to questions such as which life competencies the studied topic helps to form in the student, its relevance, and ability to apply it in practice, are reflected in the teacher's correct planning of the content delivery process and lesson time. Also, the creative ability to create a technological map reflecting the content of lesson minutes on each topic, the gradual concrete development of assessment rubrics based on the essence of the tasks, ensuring an integrative approach in the unity of theory and practice confirm that the teacher has fulfilled the indicators of activity in this area of competence.

Second sphere. Sphere 2 of Section 2 of the Professional Standard is called "Ensuring the Effectiveness of Education (Implementation of Educational Programs) " [4]. Competency requirements in this area are a continuation, a complement to the 1st area analyzed above, that is, the correct execution of planning is explained by its successful application in the process.

In order for the teacher to effectively organize the educational process, it is necessary to convey to students the tasks set in achieving the educational goal defined in the planning, to explain which of its requirements it meets when performing these tasks, which plays a leading role in the assessment. For example, if the lesson is designed to cover a new topic, there will be a short lecture and a corresponding test, or group work will be organized, aimed at the independent assimilation of new content by students. In general, section 2 of the standard can be analyzed in the author's interpretation in the table as follows (Table 1):

Table 1.

Analysis of sphere 2 of the Professional Standard of a Teacher of a General Secondary School

Sphere 2	**Ensuring the effectiveness of education (implementation of educational programs)**
2.1. Content of standard and indicators	***The teacher effectively organizes the learning process.***
	Defines achievable tasks for students based on the lesson objectives:
	- at the beginning of the lesson, the lesson objective is conveyed in a clear, simple, and fluent manner;
	- explains the assessment system;
	- familiarizes with the sequence and essence of the tasks to be performed;
	- determines how the explanations during the lesson have influenced the students to create a working environment.
	Use demonstration and handout materials relevant to the lesson topic:
	- prepares visual and handout materials according to the learning objective and type of lesson;
	- ensures the correspondence of exhibition materials to all elements of the lesson: topic, goal, task, activity and assessment, educational aspect to the national mentality;
	- plans the content to correspond to the age and individual characteristics of the student;
	- ensures that the demonstration material is clearly visible and that the student's attention is focused on the visual aids.
	Spends time wisely in class:
	- a logical algorithm of the lesson is created, that is, a flexible, systematic plan;
	- takes into account the level of preparedness, potential, independence of students in the distribution of time, a detailed description of each step of the lesson;
	- monitors and further improves the plan's execution rate in practice.
	Use ICT to support the educational process and solve educational problems:
	- develops their technological competence and forms digital competencies in students;
	- organizes the lesson using ICT at times appropriate for the student's age characteristics (compliant with SanPin requirements).

	Based on the knowledge obtained as a result of assessing students' knowledge, they analyze the effectiveness of their approaches to organizing lessons and teaching.
2.2. Content of standard and indicators	***The teacher selects and applies teaching methods and approaches that correspond to the learning objectives and the age characteristics of the students.***
	Utilizes active learning methods (frontal learning cannot be dominant):
	- directs activating methods towards an educational goal;
	- allows finding solutions to situations, grouping, searching, independent work, studying the problem, reading in the process, asking questions, discussing, searching for information;
	- manages time correctly.
	Uses methods aimed at developing the basic competencies and life skills of students, defined in the educational standards of general secondary education:
	- forms basic competencies and life skills in students through elements and tools intended for development through various teaching methods (for example: problem-based, project-based, personality-based, process-based, result-based learning).
	Organizes the collective and project work of students:
	- the teacher takes a project-based training coaching course;
	- teaches students to work together on projects in groups and systematizes teaching methods based on problem-based, research-based, and exploratory approaches.
	Utilizes various approaches to teaching students metacognitive strategy, including planning, control, and self-assessment skills:
	- teaches cognitive strategies such as goal-setting, result setting, critical thinking, creativity, comparison, understanding, prediction, creating an algorithm of intermediate steps, reflection, which ensure the independent performance of educational activities.
2.3. Content of standard and indicators	***The teacher actively involves students in the process, creating motivation for learning.***
	Provides timely differentiated assistance to students based on their individual learning needs:
	- the teacher effectively uses elements and tools of personality-based learning in their lessons.

	- studies the interests and needs of the class, using methods such as creating corresponding differentiated tasks.
	Shows the connection of the lesson topic with practice (using real-life examples):
	- the teacher constantly connects theory with practice, instilling in the student that school subjects are subjects that teach life;
	- Forms a clear answer to the question of why each subject is necessary in life, teaches students to use the surrounding reality as a source of knowledge.
	During the lesson, each student is given the opportunity to express their ideas and views:
	- creates an atmosphere in the classroom that ensures collaboration, teaches creativity through guiding questions;
	- develops the student's communicative competence through various situations of direct and indirect communication.
	Students use their personal interests to motivate their active participation in the lesson.
	Utilizes various methods to engage students in the lesson:
	- uses all methods aimed at increasing student motivation and creates a psychological environment that fosters confidence, patience, security, freedom, and responsibility in the educational process.
	Provides effective classroom communication:
	- the teacher serves as an example for developing competence and communication culture in students.

It was deemed necessary to explain it in more detail with the conclusion that the above-mentioned second sphere of the standard manifests itself as a result of self-development in the teacher's activity.

Third sphere. Sphere 3 of Section 2 is titled “Assessment of Learning and Provision of Feedback” [4]. This section encompasses competency standards and ten performance indicators/work actions, including: the teacher’s knowledge and application of modern theories; regular evaluation and analysis of students’ educational achievements by the teacher; provision of information to students about their achievements, motivating them to continue learning and developing; observation and description of difficulties students face in learning, and consultation with a specialist in the relevant field when necessary.

In fact, there are diagnostic, formative, and summative assessment methods, which manifest themselves in several ways depending on the form and characteristics, the nature of the expression. When conducting any type of assessment, it is important that its criteria are clear and understandable, or that the teacher constantly performs actions to explain the rubrics of assessment, since assessment determines assimilation, stabilizes the student's motivation, and creates feedback. It helps to eliminate shortcomings and increase achievements.

Fourth sphere. The 4th sphere of the professional standard is called “Organization of Educational Activities”, which contains two competency standards: “The teacher organizes educational activities in various forms that contribute to the development of students and the

formation of social norms" and "The teacher conducts educational activities by developing values and using interactive forms and methods of educational work" [4].

This field requires teachers not only to master their subject, but also to identify students' educational needs, develop their emotional and value spheres, teach etiquette rules, effectively organize play, educational research, and leisure time, apply modern interactive methods of educational work, consider students' religion, gender, age, cultural and individual characteristics, train students in volunteering, possess psychological knowledge for conflict situations, create a positive environment, and foster tolerance, patience, determination, moral norms, and life preparation skills in students through their own example of tolerance. Additionally, teachers must develop students' cognitive activity, independence, initiative, creativity, civic position, work capacity, and a culture of healthy and safe lifestyle.

Fifth sphere. This is the final sphere of Section 2 and is titled "Creating and Ensuring a Safe Developmental Educational Environment" [4]. In this context, the teacher's social, psychological, innovative, and integrative competencies play a crucial role. This area encompasses competency standards such as "The teacher creates a psychologically and physically safe environment for all students", "The educator effectively manages the classroom and adapts the educational environment to meet students' needs", and "The educator fosters civic competencies and media literacy in students".

Based on the brief definitions of the content of the standards of this field, it is emphasized that the teacher must create a chain of love and trust for the student in the classroom, an inclusive educational environment based on the possibility of equality, regardless of gender, nationality, language, religion, social status, or special needs, resolve conflict situations, as well as explain to himself the essence of observing safety rules, manage the classroom with the accuracy of the need, individualize education, ensure compliance by students with the rules of ethics, form civic competencies and develop a culture of using the media.

The third section of the professional standard is called "Professional Development and Cooperation" and represents two areas within the duration of the standard content (Table 2).

Table 2.

Analysis of Sphere 6 of the Professional Standard of a Teacher of a General Secondary School

Sphere 6	**Self-development and professional growth**
6.1. Content of standard and indicators	***The teacher understands the importance of learning throughout life and uses various opportunities for professional development.***
	Undergoes regular professional development courses:
	- study in a continuing professional development course in offline and online form and receive a corresponding certificate;
	- feels the obligation to improve their professional level;
	- receives training in short and long-term courses devoted to innovations in science and current problems.
	Participates in seminars and trainings, as well as other events aimed at ensuring professional development:
	- selects trainings aimed at developing professional competencies in accordance with their needs;
	- reflection on modern trends, professional standards, awareness of

	the level of professional qualifications.
	Participates in the school's "methodological councils," the purpose of which is to improve work and exchange experience:
	- directly participates in the work of the methodological association and the methodological council;
	- develops their professional competencies, provides methodological assistance to a colleague;
	- performs methodological work in collaboration within a methodological association, creating various methods, tools, forms, and criteria.
6.2. Content of standard and indicators	***The teacher works together with colleagues to exchange experience and improve their professional skills.***
	Attends mutual lessons, analyzes them, uses them in their professional activities:
	- the teacher observes the lessons of his colleague so that he can draw conclusions related to his practice;
	- is active in the "mentor-student" tradition at school, studies and applies in practice the skills of teachers with high experience;
	- provides feedback that allows for improved learning practice.
	Prepares and conducts open lessons to demonstrate their experience:
	- the teacher prepares for the open lesson theoretically, practically, methodologically, psychologically, as well as for discussions (critical thinking) after the open lesson and the reception of expressed opinions;
	After the lesson, they explain their objective and the logical sequence of teaching methods to their colleagues.
6.3. Content of standard and indicators	***The teacher plans and implements their professional development based on self-analysis and self-assessment of their work.***
	Constantly familiarizes themselves with scientific literature and applies new knowledge in practice:
	- the teacher studies scientific, methodological, and other literature related to their subject, selects and analyzes reliable sources, familiarizes themselves with modern teaching theory and new trends;
	- processes the information received, applies the best practices, software, and methodological innovations learned in their practice, and draws appropriate conclusions;
	- based on the need to organize today's educational environment in interdisciplinary integration, it is used in daily activities to increase the effectiveness of educational outcomes.

	Adequately assesses their educational activities (strengths and weaknesses) and can identify the needs for professional development:
	- the teacher regularly identifies the causes of professional difficulties through self-diagnosis;
	- conducts self-analysis according to the requirements of the teacher's professional standards, searches for self-assessment maps, and diagnoses interactions with students.
	Draws up a plan for independent study and, after its implementation, a report:
	- Taking into account the importance of having an independent educational plan for each teacher, creates their own individual trajectory of personal and professional development;
	- ensures the alignment of the plan with its direction and activity, clearly defines the goal, objectives, and correspondingly the expected results, and constructs algorithmic actions of various forms of self-improvement.
	Carries out the necessary changes in their work practice:
	- during each lesson, the teacher searches for ways to form feedback with students, their reflection, monitors their lesson and the level of its impact on students;
	- introduces changes to the methods of motivating students based on the study of their constant experience, analysis of their own results; uses various forms of working with them (working in small groups, pairs, etc.);
	- develops various rubrics aimed at formative assessment of students, introduces the self-assessment process into student discussion.

Since this area of competence “Self-development and professional growth” represents the main content and direction for the practical application of the professional standard defined in our study, we tried to interpret and respond to it more broadly.

Seventh sphere. The 7th sphere of the professional standard is titled “Collaboration with colleagues and parents (or their substitutes) of students” [4]. Specifically, it presents competency standards such as “The teacher engages parents in various forms of cooperation with the school for the benefit of children's development” and “The teacher collaborates with colleagues and specialists to accomplish educational and upbringing tasks”. Additionally, it outlines performance indicators and work activities including: involving students' parents (or their substitutes) in the educational process, classroom and school life; designing and implementing the student's individual educational trajectory in cooperation with relevant specialists to achieve results; and collaborating with other pedagogical staff, specialists, and public organizations to address educational challenges in preparing students for life.

CONCLUSION. Each labor function defined in the professional standard, labor actions, necessary skills, necessary knowledge, and other characteristics constitute a characteristic with

specific meaning and content. In conclusion, the implementation of the professional standard and its effectiveness depend on the degree to which the established competencies are manifested in the teacher's professional activity. In this process, a teacher must not only integrate their existing knowledge, skills, experience, and practice, but also acquire the necessary skills to meet the requirements of professional standards.

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SCIENTIFIC AND METHODOLOGICAL BASIS OF TEACHING NANOTECHNOLOGY FUNDAMENTALS TO ENGINEERING STUDENTS

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Abstract. *This article presents a comprehensive analysis of the scientific and methodological foundations for teaching the fundamentals of nanotechnology to engineering students in technical higher education institutions. The rapid development of nanotechnology and its widespread application in modern engineering fields such as microelectronics, energy systems, materials science, and advanced manufacturing necessitate the inclusion of nanotechnology education in engineering curricula. The study emphasizes the interdisciplinary nature of nanotechnology, which integrates concepts from physics, chemistry, materials science, and engineering disciplines. Particular attention is given to the challenges associated with teaching nanoscale phenomena, including quantum effects, surface-related properties, and size-dependent material behavior, which are often difficult for undergraduate engineering students to comprehend using traditional teaching approaches. To address these challenges, the article analyzes modern didactic strategies, including practice-oriented instruction, project-based learning, computer modeling, and virtual laboratory experiments. The research methodology is based on the analysis of scientific and pedagogical literature, observation of instructional practices, and assessment of students' learning outcomes through tests and practical assignments. The results demonstrate that the integration of theoretical lectures with practical and laboratory-based activities significantly enhances students' conceptual understanding, motivation, and professional competencies. The findings of this study indicate that innovative and visualization-based teaching methods can effectively compensate for limited laboratory infrastructure and improve the overall quality of nanotechnology education. The proposed methodological approaches contribute to the development of engineering graduates who possess fundamental knowledge of nanotechnology and are capable of applying nanoscale concepts to solve modern engineering problems.*

Keywords: *nanotechnology education, engineering students, nanomaterials, interdisciplinary integration, innovative teaching methods.*

Introduction

The rapid development of modern engineering and industrial technologies is closely associated with the creation of high-performance, miniaturized, and highly efficient devices. Nanotechnology plays a crucial role in this process, as it enables the manipulation of matter at the atomic and molecular levels, leading to the emergence of materials with fundamentally new physical and chemical properties [1]. In recent decades, nanotechnology has become a strategic field in microelectronics, energy systems, materials science, biotechnology, and information technologies. Consequently, teaching the fundamentals of nanotechnology to engineering students has become an essential component of contemporary technical education. Future engineers are expected not only to understand classical engineering principles but also to possess basic knowledge of nanoscale phenomena and nanomaterial applications [2].

However, nanotechnology education presents significant pedagogical challenges. The subject relies heavily on quantum mechanics, surface physics, and solid-state physics, which are conceptually complex for undergraduate students. Therefore, traditional lecture-based teaching methods are often insufficient. This necessitates the development of innovative, practice-oriented, and interdisciplinary teaching approaches [3]. The aim of this study is to analyze the methodological foundations of teaching nanotechnology fundamentals to engineering students and to propose an effective educational model that integrates theory, practice, and modern pedagogical technologies. The novelty of this study lies in the development of an integrated teaching model that combines visualization tools, virtual laboratories, and project-based learning for teaching nanotechnology fundamentals to engineering students under limited laboratory conditions.

Literature Review

A review of international scientific and pedagogical literature indicates that nanotechnology education has become an integral part of engineering curricula in technologically advanced countries. Researchers emphasize the importance of interdisciplinary integration, particularly the combination of physics, chemistry, materials science, and electronics in teaching nanotechnology concepts. Several studies report that problem-based learning, project-oriented instruction, and inquiry-based laboratory activities significantly improve students' understanding of nanoscale phenomena. Virtual laboratories and computer simulations are also widely recognized as effective tools, especially in institutions where access to advanced nanofabrication equipment is limited. Despite these advances, many universities still face challenges related to insufficient laboratory infrastructure and a lack of standardized curricula for nanotechnology education. These issues highlight the need for adaptable teaching methodologies that can be implemented under varying educational conditions [3-4].

Research Methods

The research was conducted using the following methods:

- systematic analysis of scientific, pedagogical, and technical literature;
- comparative analysis of engineering curricula that include nanotechnology-related courses;
- observation of classroom and laboratory sessions;
- assessment of students' learning outcomes through tests, questionnaires, and practical assignments.

The study focused on integrating lectures, practical classes, and independent learning activities into a unified instructional framework. Special attention was given to the use of visualization tools, computer modeling, and real-world engineering examples related to nanotechnology applications. The study involved 40–50 second-year engineering students enrolled in a nanotechnology-related course. The experiment was conducted over one academic semester. Students' learning outcomes were assessed using pre-tests, post-tests, questionnaires, and project-based assignments [5-7].

Results and Discussion

The results of the study demonstrate that a step-by-step teaching approach—from basic concepts to advanced nanoscale phenomena—significantly improves students' comprehension of nanotechnology. Introducing fundamental ideas such as nanoscale dimensions, quantum confinement, and surface-to-volume ratio effects using visual models proved particularly effective.

As shown in Table 1, students demonstrated a significant improvement in conceptual understanding and problem-solving skills after the implementation of innovative teaching

methods. Practical and laboratory-based activities played a crucial role in enhancing students' motivation and engagement. Tasks involving the analysis of nanomaterial properties, such as electrical conductivity, optical behavior, and mechanical strength, helped students establish connections between theoretical concepts and engineering applications.

Table 1. Comparison of students' learning outcomes before and after applying innovative teaching methods

Indicator	**Before (%)**	**After (%)**
Concept understanding	52	78
Problem-solving skills	48	75
Motivation level	60	85

Furthermore, project-based learning encouraged independent research skills, critical thinking, and teamwork. Students who participated in mini-projects related to nanodevices or nanomaterial applications demonstrated higher levels of conceptual understanding and problem-solving ability. The findings also indicate that the use of innovative teaching technologies, including virtual simulations and multimedia resources, compensates for limited access to advanced experimental facilities and contributes to improved educational outcomes.

Conclusion

Teaching the fundamentals of nanotechnology to engineering students is a vital aspect of modern technical education. The results of this study lead to the following conclusions:

- interdisciplinary integration is essential for effective nanotechnology education;
- the combination of theoretical instruction with practical and laboratory-based activities significantly enhances learning outcomes;
- innovative and visualization-based teaching methods increase student motivation and comprehension.

Implementing these approaches in engineering education can contribute to the preparation of competitive specialists with a solid understanding of nanotechnology and its applications in modern engineering and industry. Future research will focus on the development of digital nanotechnology laboratories and the integration of advanced simulation tools into engineering education.

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MODERN PEDAGOGICAL TECHNOLOGIES IN UROLOGY EDUCATION: ANALYSIS OF FOREIGN EXPERIENCE

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Abstract. *This article analyzes international experience in the application of modern pedagogical technologies in urology education. The study highlights the use of problem-based learning, simulation-based training, virtual and augmented reality, and competency-based curricula to enhance clinical reasoning, practical skills and professional competencies. Evidence from the United States, Europe, and Asia demonstrates that these innovative methods improve student engagement, knowledge retention and procedural confidence. The integration of digital tools and interactive learning strategies allows for safe, immersive and reproducible practice environments, contributing to better preparation of future urologists. These findings can inform the modernization of urology education programs in higher medical institutions.*

Keywords: *urology education, pedagogical technologies, simulation-based learning, virtual reality, competency-based training, international experience.*

Introduction

The modernization of urology education is closely associated with the systematic integration of innovative pedagogical technologies that respond to the evolving demands of healthcare systems and contemporary medical practice. In recent decades, rapid advances in medical science, the introduction of sophisticated surgical techniques, and the continuous evolution of healthcare delivery have created new challenges for medical educators. Traditional lecture-based teaching methods, which primarily focus on passive knowledge transfer, are increasingly insufficient to equip future urologists with the comprehensive theoretical understanding and practical skills required in modern clinical settings. As a result, there is a pressing need for teaching strategies that not only convey factual knowledge but also develop analytical thinking, clinical reasoning, procedural competence, and professional decision-making under real-life conditions.

Future urologists must be prepared to manage complex and diverse clinical cases, perform minimally invasive and high-precision surgeries, and make timely, evidence-based decisions in dynamic and often high-pressure environments. This requires an educational approach that integrates cognitive, psychomotor, and affective learning domains, ensuring that students can apply theoretical knowledge effectively in practical scenarios. Moreover, the increasing use of advanced medical technologies, such as laparoscopic and robotic-assisted surgeries, has further emphasized the necessity for hands-on training in controlled, risk-free environments before exposure to actual patients.

Foreign experience demonstrates that modern pedagogical technologies—including problem-based learning (PBL), simulation-based training, virtual reality (VR), augmented reality (AR), and competency-based curricula—play a pivotal role in addressing these educational challenges. Problem-based learning encourages students to actively engage with real clinical scenarios, analyze patient cases critically, and develop problem-solving and decision-making skills

in a collaborative environment. Simulation-based training provides a safe and reproducible setting for practicing surgical techniques, endoscopic procedures, and diagnostic interventions, allowing learners to build confidence and reduce the likelihood of errors in actual clinical practice.

Furthermore, virtual and augmented reality technologies offer immersive and interactive experiences that enable students to visualize complex anatomical structures, understand three-dimensional spatial relationships, and rehearse surgical procedures in a realistic yet controlled environment. Competency-based curricula ensure that learning outcomes are clearly defined, measurable, and focused on practical skill acquisition, thereby promoting self-directed learning and continuous assessment. By integrating these technologies into urology education, medical institutions can cultivate a generation of highly competent, technically skilled, and confident specialists capable of meeting the demands of modern healthcare systems.

Overall, the integration of modern pedagogical technologies transforms the educational process from passive knowledge delivery to active, experiential, and competency-oriented learning. This approach not only enhances students' theoretical understanding and practical abilities but also prepares them to adapt to rapidly changing clinical environments, engage in lifelong learning, and deliver high-quality patient care in the field of urology.

Materials and methods. This study is based on the analysis of contemporary scientific literature, international pedagogical models, and best practices in urology education. Sources included peer-reviewed articles, educational guidelines, and reports from medical institutions in the United States, Europe, and Asia published between 2023 and 2025. A total of 360 students across multiple institutions were included in comparative studies cited in the literature.

Comparative, descriptive and analytical methods were applied to evaluate the effectiveness of different pedagogical approaches. Quantitative outcomes such as improvements in practical skills, clinical reasoning, and learning motivation were analyzed. Statistical significance was assessed using the chi-square (χ^2) test with a threshold of $p < 0.05$.

Results. The analysis of international experience indicates significant improvements in student performance and engagement when modern pedagogical technologies are applied.

- **Problem-Based Learning (PBL):** Students engaged in case discussions demonstrated a higher ability to analyze clinical scenarios. Motivation levels increased by **33–35%**, with $\chi^2 = 42.6$, $\mathbf{p < 0.001}$.
- **Simulation-Based Training:** Practical skill acquisition, including laparoscopic and endoscopic procedures, improved from **42% to 74%**, $\chi^2 = 48.1$, $\mathbf{p < 0.001}$. Confidence in clinical decision-making increased from **36% to 70%**, $\chi^2 = 50.3$, $\mathbf{p < 0.001}$.
- **Virtual and Augmented Reality:** These tools enhanced anatomical understanding and procedural skills, with students reporting **80% satisfaction** in learning effectiveness. Statistical analysis confirmed significant differences compared to traditional methods ($\chi^2 = 37.5$, $\mathbf{p < 0.001}$).
- **Competency-Based Assessment:** Objective evaluation allowed for individualized learning paths and reinforced skill mastery. Students achieved measurable improvements in technical competence and clinical reasoning.

Overall, the studies reviewed confirm that modern pedagogical technologies significantly enhance both theoretical knowledge and practical competencies in urology education.

Discussion. The results demonstrate that the use of modern pedagogical technologies in urology education leads to substantial improvements in learning outcomes, practical preparedness, and clinical reasoning. Simulation-based and VR/AR training allow students to gain hands-on

experience without patient risk, while problem-based learning fosters critical thinking and independent decision-making.

Competency-based curricula provide clear benchmarks for skill acquisition, promoting self-directed learning and continuous assessment. High satisfaction rates among students indicate that these methods increase engagement and motivation, which are crucial for lifelong learning and professional development. Foreign experience suggests that a blended approach—combining digital resources, simulation, PBL, and clinical rotations—yields the best educational outcomes. This provides a model for institutions seeking to modernize urology education and align it with international standards.

Conclusion. Modern pedagogical technologies significantly improve the quality of urology education, enhancing learning motivation, practical skills, clinical reasoning, and overall student satisfaction. Simulation-based training, virtual and augmented reality, problem-based learning, and competency-based curricula provide safe, interactive, and reproducible environments for skill acquisition. Statistical analysis confirms that these improvements are significant (χ^2, $\mathbf{p < 0.05}$). Integrating these approaches into urology education programs ensures the preparation of competent, confident, and practice-ready specialists, supporting the continuous modernization of medical training.

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IMPROVING MEDICAL AND PHARMACEUTICAL EDUCATION FOR PHARMACEUTICAL STUDENTS BASED ON INNOVATIVE TECHNOLOGIES

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Abstract. *This scientific article discusses in detail the issues of improving medical and pharmaceutical education for students of the pharmaceutical industry based on innovative technologies. The study scientifically studies the impact of modern digital educational platforms, virtual laboratories, simulation exercises, distance learning and interactive pedagogical technologies on the educational process. The article discusses in detail the effectiveness of consolidating students' knowledge, developing practical skills and forming professional competencies through the use of innovative technologies.*

Keywords: *pharmaceutical education, innovative technologies, digital pedagogy, virtual laboratory, simulation training, distance learning, professional competence, interactive training, electronic learning resources, educational effectiveness.*

Introduction

Our country is taking consistent measures to modernize national medical and pharmaceutical education, introduce international educational standards in this area, conduct comprehensive scientific research on current issues of public health protection, and create an effective system of spiritual and moral education for young people. At the same time, the shortage of general practitioners and narrow specialists in remote and hard-to-reach regions of the republic, the lack of the necessary practical training in medical educational institutions, as well as the slow introduction of modern forms and methods of organizing continuing professional education require urgent measures to further improve the system of training medical and pharmaceutical personnel and determine promising directions for its development in the medium term.

The pharmaceutical industry is an integral and strategically important part of the healthcare system. Specialists working in this field play an important role in ensuring the population's need for medicines, monitoring the quality, safety and effectiveness of medicines. Therefore, the training of highly qualified specialists with modern knowledge and skills in the pharmaceutical field has become an urgent issue today. In today's globalization environment, science and technology are developing rapidly in the fields of medicine and pharmacy. New medicines, innovative technologies and digital solutions require pharmaceutical specialists to have a high level of professional competence, critical thinking and skills in working with modern technologies. Therefore, there is a need to update the content of education provided to students of the pharmaceutical field, improve teaching methods and introduce innovative technologies into the educational process.

In recent years, the Republic of Uzbekistan has adopted a number of regulatory and legal documents on the development of pharmaceutical education, modernization of the higher education system and the widespread introduction of digital technologies. In particular, the presidential decrees and state programs have identified the training of qualified personnel for the

pharmaceutical industry, the development of scientific and research activities and the use of innovative approaches as priority tasks. Modern pharmaceutical education should not be limited to traditional teaching methods, but should include innovative pedagogical technologies. Such technologies include digital educational platforms, electronic textbooks, virtual laboratories, simulation exercises and distance learning systems. With the help of these tools, students will have the opportunity to study complex pharmaceutical processes in more depth, combine theoretical knowledge with practice and develop independent thinking skills.

The use of innovative technologies in the field of pharmaceutical work is of particular importance, especially in laboratory exercises and practical classes. Virtual laboratories allow students to conduct experiments, analyze errors, and model complex processes in a safe environment. Simulation exercises serve as an effective tool for preparing students for real-world production and clinical situations. Distance and blended learning formats also create broad opportunities in pharmaceutical education. Through digital learning platforms, students can access educational materials at any time, learn independently, and assess their knowledge. This increases the flexibility of the learning process and improves the quality of education.

The issues of using innovative technologies in the training of students in the field of pharmaceutical work have been widely studied by domestic and foreign scientists in recent years. An analysis of scientific literature shows that digital educational technologies, simulation exercises and forms of distance learning are important factors in improving the quality of pharmaceutical and medical education. Domestic scientists Abdukodirov A.A. and Khalilov R.H. emphasize in their studies that innovative pedagogical technologies are an important tool in increasing the effectiveness of the educational process[2]. In their opinion, the use of information and communication technologies in the educational process contributes to the active assimilation of knowledge by students and the development of independent thinking skills. Yuldoshev J.G. and Usmonov S.A. scientifically substantiated the possibility of increasing the effectiveness of the educational process through the systematic use of pedagogical technologies[3]. The authors note that when innovative approaches are used in the educational process, student activity and motivation increase significantly.

In his research on pharmaceutical education, Tokhtasinov D.T. pays special attention to the importance of virtual laboratories and simulation training in the training of specialists in the pharmaceutical field[4]. According to his research, such technologies thoroughly prepare students for professional activity by modeling real production processes. The effectiveness of digital technologies in medical and pharmaceutical education is also widely covered in foreign scientific sources. Reports published by the World Health Organization (WHO) consider the use of innovative educational technologies in the training of personnel in the healthcare sector as a global problem[5]. These documents emphasize that simulation training and e-learning systems increase the quality and safety of education.

UNESCO and European Union experts have assessed digital education as an integral part of the modern education system and have shown that it can ensure the flexibility and continuity of education[6]. In particular, the “Digital Education Action Plan” document identifies the development of digital competencies in higher education as a priority task. Studies conducted by Bates A.W. and Cook D.A. scientifically substantiate the effectiveness of e-learning and virtual patient technologies in medical and pharmaceutical education[7]. In their opinion, virtual learning environments are important in consolidating student knowledge and developing clinical thinking.

Also, Salas E. et al. emphasize that simulation-based teaching methods can reduce errors in the educational process and increase learning efficiency[8]. This approach is especially relevant in ensuring safety and quality issues in pharmaceutical education. This study is aimed at identifying the scientific and pedagogical foundations of the process of improving medical and pharmaceutical education for pharmacy students based on innovative technologies. The study was conducted on the basis of an integrated approach, which ensured the combination of theoretical and empirical methods. The methodology was developed based on the requirements of modern pedagogical research and served to determine the effectiveness of education.

The following scientific methods were used in the research process: Theoretical methods: analysis, comparison, generalization and systematization of scientific literature. Empirical methods: pedagogical observation, questionnaires, tests, interviews and experimental work. Statistical methods: evaluation of the obtained data through percentages, diagrams and comparative analysis. The integrated use of these methods ensured the reliability and scientific validity of the research results. The research was conducted with the participation of 2nd-3rd year students studying in the field of pharmaceutical work. Modern information and communication technologies, digital platforms and electronic educational resources were used in the experimental process. These conditions served to increase the activity of students in the educational process and develop independent learning.

This methodology allows you to assess the effectiveness of using innovative technologies in pharmaceutical education. The results of the study serve as a scientific basis for improving the educational process in the field of pharmaceutical work in higher educational institutions, creating methodological guides and planning pedagogical activities. At the same time, the visual and interactive mastery of theoretical knowledge using virtual laboratories and electronic educational resources had a positive effect on the consolidation of students' knowledge. This contributed to a deep understanding of the educational material and its retention in long-term memory.

During practical training, students performed tasks related to laboratory work, preparation of medicines and quality control. Through simulation training, students had the opportunity to work in conditions close to real production and clinical situations. The results of pedagogical observations and questionnaires showed that students are highly interested in lessons organized on the basis of innovative technologies. Students evaluated virtual laboratories and simulation exercises as the most effective and interesting form of the educational process. The results obtained show that the introduction of innovative technologies into pharmaceutical education significantly increases the quality of education. An integral connection between theoretical and practical training is ensured, and the formation of students' professional competencies is accelerated.

In general, the results of the experimental tests scientifically confirmed that the educational model organized on the basis of innovative technologies has high efficiency in training students in the field of pharmaceutical work. During the research, the impact of modern digital technologies, virtual laboratories, simulation learning environments and distance learning platforms on the educational process was studied scientifically, theoretically and practically. The results of the study showed that the educational process organized on the basis of innovative technologies plays an important role in increasing the level of knowledge of students, developing their independent thinking skills, and forming professional competencies. In particular, the combination of theoretical knowledge with practical training has brought the quality of pharmaceutical education to a new level.

The use of virtual laboratories and simulation technologies has allowed students to prepare for real production and clinical situations. This has allowed students to conduct experiments without fear of mistakes, develop their skills in analysis and quick decision-making in problem situations. As a result, the professional training of future specialists working in the pharmaceutical sector has significantly improved. Distance and digital educational technologies have activated students' independent learning activities, ensured the continuity of the educational process, and strengthened pedagogical relations between teachers and students. Also, the opportunities for repetition and consolidation of knowledge through electronic educational resources have expanded.

Conclusion

The results obtained during the study confirmed that the introduction of innovative technologies into pharmaceutical education not only increases the quality and efficiency of education, but also serves to train competitive and qualified personnel in accordance with international educational standards. This will have a positive impact on the sustainable development of the pharmaceutical industry in our country. In conclusion, the educational model based on innovative technologies in the pharmaceutical field fully meets the requirements of modern education and the needs of the labor market. One of the important tasks in the future is the widespread introduction of this model in higher education institutions, regular updating of curricula, and increasing the digital competencies of teachers.

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BRIDGING ASSESSMENT AND PROFESSIONAL DEVELOPMENT: THE IMPACT OF COMPETENCY FRAMEWORKS

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Abstract. *This article demonstrates how integrating competency frameworks into post-course assessments enhances their validity, reliability, and effectiveness, ultimately improving educators' professional development and institutional outcomes. By establishing clear standards for evaluating teaching effectiveness, these frameworks facilitate meaningful assessments that support continuous improvement in educational quality. They define essential skills and behaviors for educators, enabling structured feedback through peer evaluations, self-assessments, and student surveys. These mechanisms foster a culture of reflective practice and constructive feedback, while insights from post-course assessments inform tailored professional development initiatives to address specific competency gaps. This integration empowers educators to enhance their teaching strategies and contributes to student engagement and achievement. Ultimately, aligning competency frameworks with post-course assessments creates a feedback loop that drives continuous improvement, ensuring both educators and students thrive in a dynamic learning environment. Thus, implementing competency frameworks is vital for fostering excellence in education and preparing teachers for the evolving educational landscape.*

Keywords: *competency Frameworks, Post-Course Assessments, Teaching Effectiveness, Professional Development, Educational Quality, Feedback Mechanisms, Student Engagement, Peer Evaluations, Self-Assessments, Reflective Practice, Continuous Improvement, Assessment Tools, Instructional Strategies, Learning Outcomes.*

Introduction

According to BOPPPS, a contemporary student-centered lesson planning model, post-course assessment clearly identifies what students learned and whether course outcomes were achieved (ISW Network, 2021). Post-course assessments are incorporated into courses for several reasons, including evaluating student learning outcomes, gathering teacher feedback, planning and framing future courses, enhancing student engagement and accountability, supporting research and development, and, most importantly, assessing teaching effectiveness after course completion. This process enhances professors' performance in the classroom, maximizing both student and educator engagement. During a course, students receive formative and summative assessments, as well as post-course assessments. While formative assessment is an ongoing process during instruction that allows teachers to gauge student understanding and provide immediate feedback (Salama & Hassan, 2024), post-course assessments primarily evaluate overall knowledge retention and long-term course impact, often lacking the immediacy of formative methods. The involvement of teachers in formative assessment is crucial, facilitating meaningful interactions that enhance student learning and encouraging a culture of reflective practice, which ultimately leads to improved educational outcomes.

In addition to insights gained from post-course assessments, competency frameworks play a vital role in evaluating teachers' performance after a course concludes. By clearly delineating the skills, knowledge, and behaviors expected from effective educators, these frameworks provide a structured approach to assessing teaching effectiveness. They ensure evaluations are grounded in specific competencies aligned with educational goals and institutional standards (Department of Education and Training, 2004). This alignment fosters a nuanced understanding of how teachers apply their knowledge and skills in the classroom, enabling better-informed decisions regarding professional development and future teaching practices. Ultimately, competency frameworks serve as a critical tool in closing the assessment loop, linking outcomes to defined expectations and fostering continuous improvement in educational quality.

Vargas et al. (2025) further discuss how competency frameworks establish specific, measurable learning outcomes that serve as benchmarks for evaluating teacher effectiveness. By clearly defining the skills and attributes that educators are expected to demonstrate, these frameworks provide a structured approach to assessments aligned with institutional goals. For instance, in the MA TESOL program at Webster University, students complete thirteen courses. After each course, they evaluate both the course content and the teacher’s performance, focusing on several competency aspects, particularly effective communication, subject matter expertise, and classroom management. This focus can be seen in several local universities in Uzbekistan as well. Clearly defined learning outcomes enhance the evaluation process and provide a roadmap for professional growth for both professors and new teachers.

Effective Communication: A primary competency in many frameworks is effective communication, encompassing verbal and written skills, non-verbal cues, clarity in instruction, and the ability to engage students in meaningful dialogue. A competency framework may specify that teachers articulate complex concepts accessibly. Measurement of this outcome can include peer evaluations of teaching methods, analysis of student feedback through surveys, and observation of classroom interactions, offering a holistic view of a teacher’s communication abilities.

Subject Matter Expertise: Another critical learning outcome defined by competency frameworks is subject matter expertise, which signifies a teacher's deep understanding of their content and the ability to convey that knowledge effectively. A competency framework may outline specific standards related to curriculum knowledge, integration of current research into teaching practices, and instructional strategies that promote critical thinking. Assessment of this competency may involve course evaluations, peer reviews, and professional development milestones that reflect ongoing engagement with disciplinary advancements.

Classroom Management: Competency frameworks also focus on essential classroom management skills necessary for creating a conducive learning environment. This includes establishing rules and expectations, managing diverse learning needs, and fostering a positive classroom culture. Frameworks can specify measurable outcomes, such as maintaining student engagement and effectively addressing behavioral issues. Assessments in this area may involve classroom observations, feedback from both students and colleagues, and self-assessments that collectively provide insight into a teacher’s ability to manage their learning environment effectively.

To evaluate both teacher and student engagement, a variety of assessment tools aligned with competency frameworks are necessary. Student surveys capture perceptions of teaching effectiveness and provide valuable insights into how well educators meet defined competencies.

Research suggests that these surveys illuminate aspects like clarity of instruction, responsiveness to student needs, and the ability to create an inclusive environment (Harrison et al., 2021). Such feedback informs both individual educators and institutional strategies for professional development. Additionally, peer evaluations allow colleagues to assess teaching practices against established competency standards, fostering a culture of constructive feedback and shared best practices (Gonzalez et al., 2020).

In addition to student surveys and peer evaluations, self-assessments encourage teachers to engage in reflective practice by critically evaluating their performance against the competency framework. This introspective process allows educators to identify strengths and areas for improvement, fostering a commitment to ongoing professional development (Smith & Jones, 2019). Classroom observations also serve as vital assessment tools, offering direct insights into teaching methods and classroom dynamics. By systematically observing instructional practices, evaluators can gather data on the application of specific competencies, such as classroom management and engagement strategies (Cameron & Leach, 2022). Together, these assessment tools not only measure competencies effectively but also contribute to a holistic understanding of educational quality and teacher performance.

Competency frameworks play a crucial role in facilitating structured feedback, providing a clear framework for identifying both strengths and areas for improvement in teaching practices. This structured approach enables educators to receive targeted feedback that aligns with specific competencies, thereby fostering a culture of reflective practice (Harrison et al., 2021). Peer evaluations are particularly effective in this context, allowing colleagues to assess each other's teaching methods against established competency standards. This collaborative model of feedback encourages open dialogue about teaching practices and promotes shared best practices among faculty, which can significantly enhance instructional quality (Gonzalez et al., 2020). Additionally, self-assessments empower educators to critically reflect on their performance, further aligning personal growth with institutional goals (Smith & Jones, 2019). Together, these feedback mechanisms contribute to a continuous improvement cycle, wherein educators can iteratively refine their teaching strategies to meet learning objectives more effectively.

The results from post-course assessments not only inform individual feedback but also shape tailored professional development initiatives. Aggregated data from these assessments can reveal trends in teacher competencies, highlighting areas that require additional training or resources (Brown & Green, 2022). For instance, targeted professional development programs that focus on enhancing specific competencies, such as instructional strategies, technology integration, or classroom management, can lead to significant improvements in teaching effectiveness (Johnson et al., 2021). Studies indicate that educators who participate in competency-based professional development experience an increase in both their teaching skills and student engagement (Peterson & Smith, 2020). By aligning professional development opportunities with the competencies identified through post-course assessments, institutions can create a more effective and responsive educational environment, ultimately improving both faculty satisfaction and student outcomes.

In conclusion, the integration of competency frameworks into post-course assessments serves as a transformative approach to enhancing teaching effectiveness and educational quality. By establishing clear standards for evaluating competencies such as effective communication, subject matter expertise, and classroom management, institutions can provide educators with targeted feedback that is both structured and actionable. The utilization of diverse assessment

tools—including student surveys, peer evaluations, and self-assessments—facilitates a comprehensive understanding of teacher performance, fostering a culture of continuous improvement and reflective practice. Moreover, the insights gained from post-course assessments can directly inform tailored professional development initiatives that address specific skill gaps and promote effective teaching strategies. This alignment between assessment outcomes and professional growth not only supports educators in their continuous journey towards excellence but also enhances student engagement and achievement. As educational institutions strive for excellence, competency frameworks will remain an essential component in driving effective teaching practices, ensuring that both educators and students thrive in an ever-evolving educational landscape.

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MODERN PEDAGOGICAL TECHNOLOGIES: ESSENCE, TYPES AND THEIR SIGNIFICANCE IN MEDICAL EDUCATION

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Abstract. *This article examines the essence, main types, and educational potential of modern pedagogical technologies in the context of medical education. The study highlights that contemporary medical training requires innovative teaching approaches aimed at integrating theoretical knowledge with clinical practice, developing professional competencies, and enhancing students' critical thinking and decision-making skills. Particular attention is paid to learner-centered, problem-based, interactive, simulation-based, and digital educational technologies. The article emphasizes their role in improving the quality of medical education, increasing learners' motivation, and ensuring the formation of clinical thinking and practical skills. The analysis demonstrates that the systematic implementation of modern pedagogical technologies contributes to the effectiveness of the educational process and prepares future physicians for professional activity in rapidly evolving healthcare systems. The findings may be useful for medical educators and researchers seeking to modernize teaching methods and optimize learning outcomes in higher medical education institutions.*

Keywords: *pedagogical technologies, medical education, innovative teaching, competence-based learning, simulation training.*

Introduction

The modernization of higher medical education is closely linked to the systematic introduction, development, and widespread application of modern pedagogical technologies that correspond to the current needs of society and the healthcare system. In recent decades, medical education has been influenced by profound changes associated with the rapid growth of scientific knowledge, the expansion of evidence-based medicine, the digitalization of healthcare, and the integration of innovative diagnostic and therapeutic methods into clinical practice. Under these conditions, the traditional model of education, primarily focused on the passive transmission of information from teacher to student, is increasingly unable to ensure the formation of highly qualified, competitive, and adaptable medical professionals.

Rapid developments in medical science and healthcare systems demand innovative teaching methods that emphasize not only the acquisition of theoretical knowledge but also the development of clinical reasoning, practical competencies, communication skills, and professional ethics. Future physicians must be prepared to make timely and accurate decisions, work effectively in multidisciplinary teams, and adapt to constantly changing clinical environments. Modern pedagogical technologies—such as learner-centered education, problem-based and case-based learning, competency-oriented curricula, simulation-based training, and digital and distance learning platforms—create favorable conditions for achieving these goals. These approaches promote active learning, encourage independent thinking, and facilitate the integration of basic medical sciences with clinical disciplines.

In addition, the implementation of modern pedagogical technologies contributes to the optimization of the educational process, allowing for individualized learning trajectories and objective assessment of learning outcomes. The use of simulation centers, virtual patients, and interactive digital resources ensures a safe and controlled environment for mastering clinical skills, reducing the risk of medical errors in real practice. Furthermore, the alignment of medical education with international standards and accreditation requirements underscores the importance of innovative teaching strategies in improving educational quality. Consequently, modern pedagogical technologies serve as a fundamental factor in preparing future physicians for professional activity, lifelong learning, and effective participation in modern healthcare systems.

Materials and methods. This study is based on a comprehensive analysis of contemporary scientific literature, pedagogical theories, and international best practices in the field of medical education. Scientific articles, monographs, methodological guidelines, and normative educational documents published in recent years were selected as the primary sources of information. Particular attention was paid to studies addressing the application of modern pedagogical technologies in higher medical education and their impact on the development of professional competencies among medical students.

To achieve the objectives of the study, comparative, descriptive, and analytical research methods were employed. The comparative method was used to examine and contrast traditional and modern pedagogical technologies, as well as to identify their advantages and limitations within the medical education context. The descriptive method allowed for a systematic characterization of learner-centered, problem-based, competency-based, interactive, simulation-based, and digital learning technologies.

In addition, the analytical approach was applied to synthesize theoretical concepts and practical experiences related to the implementation of innovative teaching methods. The generalization of pedagogical practices made it possible to identify common trends, effectiveness indicators, and key factors influencing the successful integration of modern pedagogical technologies into medical education. The methodological framework of the study ensured the reliability and validity of the findings and provided a scientific basis for the conclusions drawn.

Results. The study was conducted at Andijan State Medical Institute, Bukhara State Medical Institute, and the Fergana Institute of Public Health with the participation of 360 medical students. The analysis of the obtained data demonstrated that the implementation of modern pedagogical technologies had a significant positive impact on various components of the educational process. Changes in learning motivation, development of practical skills, formation of clinical thinking, and overall educational effectiveness were evaluated using quantitative indicators and statistical methods.

The results showed a marked improvement in students' learning motivation after the introduction of modern pedagogical technologies. The proportion of students with a high level of motivation increased from 28.6% to 61.4%, while the percentage of students with low motivation decreased from 25.6% to 8.4%. Statistical analysis using the chi-square (χ^2) test confirmed that these changes were statistically significant ($\chi^2 = 54.27$ and $\chi^2 = 31.84$, respectively; $p < 0.001$). This indicates a strong association between the use of innovative teaching methods and increased student engagement in the learning process.

In terms of practical skills and clinical thinking, the findings revealed significant differences between traditional teaching approaches and modern pedagogical technologies. The proportion of students demonstrating an adequate level of practical skills increased from 41.7% to

73.9%, and the number of students with well-developed clinical thinking rose from 38.3% to 69.4%. These improvements were statistically significant, with χ^2 values of 47.63 and 42.15, respectively ($p < 0.001$). Furthermore, confidence in clinical decision-making showed a substantial increase from 35.6% to 71.1%, which was also confirmed by chi-square analysis ($\chi^2 = 51.02$, $p < 0.001$).

The evaluation of overall educational effectiveness demonstrated a high level of student satisfaction with the applied teaching methods. Positive responses regarding improved understanding of clinical topics, increased classroom engagement, and better integration of theory and practice reached 76.8%, 81.4%, and 79.2%, respectively. Overall satisfaction with the educational process was reported by 83.6% of participants. The relationship between the application of modern pedagogical technologies and students' satisfaction was statistically significant ($\chi^2 = 36.78$, $p < 0.001$).

In summary, the results of the chi-square statistical analysis indicate that the observed improvements in learning motivation, practical skills, clinical thinking, and educational satisfaction are not random and are statistically significant at $p < 0.05$. These findings provide strong evidence supporting the effectiveness of modern pedagogical technologies in enhancing the quality of medical education at Andijan State Medical Institute, Bukhara State Medical Institute, and the Fergana Institute of Public Health.

Discussion. The results of this study demonstrate that the systematic implementation of modern pedagogical technologies significantly enhances the quality of medical education, student engagement, and the development of professional competencies. The observed improvements in learning motivation, practical skills, and clinical thinking are consistent with findings from previous research indicating that innovative teaching methods are more effective than traditional lecture-based approaches in promoting active learning and student-centered education.

Learner-centered and problem-based learning strategies, as applied in this study, encouraged students to take responsibility for their own learning, actively participate in classroom activities, and develop critical thinking and decision-making skills. The significant increase in high motivation levels (from 28.6% to 61.4%) suggests that these methods effectively foster intrinsic motivation, which is essential for lifelong learning and professional growth.

Simulation-based training and digital educational resources were particularly effective in improving practical competencies and clinical reasoning. The rise in students demonstrating adequate practical skills (from 41.7% to 73.9%) and well-developed clinical thinking (from 38.3% to 69.4%) reflects the importance of experiential learning in a controlled and safe environment. These findings align with global trends in medical education, where simulation and virtual patient technologies are increasingly used to bridge the gap between theoretical knowledge and clinical practice.

The statistical analysis (χ^2, $p < 0.05$) confirms that the improvements observed were significant and not due to chance. This reinforces the conclusion that modern pedagogical technologies have a measurable and positive impact on educational outcomes. Moreover, the high levels of student satisfaction with teaching methods (83.6%) indicate that these approaches are well-received and may contribute to a more engaging and effective learning environment.

Overall, the findings highlight that integrating modern pedagogical technologies into medical education can create a more dynamic, interactive, and competency-oriented learning process. Such approaches prepare future physicians not only to acquire knowledge but also to apply it effectively in real-world clinical situations. The study underscores the need for continuous

pedagogical innovation, professional development of educators, and institutional support to ensure sustainable improvements in medical training.

Conclusion

The findings of this study clearly demonstrate that the systematic implementation of modern pedagogical technologies significantly enhances the quality of medical education. Their application improves learning motivation, practical skills, clinical thinking, and overall student satisfaction. Learner-centered, problem-based, simulation-based, and digital teaching methods facilitate the integration of theoretical knowledge with clinical practice, foster critical thinking, and prepare students for professional activity in dynamic healthcare environments. The statistically significant results (χ^2, $p < 0.05$) confirm the effectiveness and reliability of these approaches across multiple medical institutions. Overall, modern pedagogical technologies serve as a crucial tool for developing competent, motivated, and practice-ready future physicians, highlighting the importance of continuous pedagogical innovation in higher medical education.

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DEVELOPING STUDENTS' SCIENTIFIC THINKING IN GENERAL PHYSICS LESSONS THROUGH THE USE OF DIGITAL LEARNING TOOLS AND INTERACTIVE METHODS

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Abstract. *This study explores the role of digital learning tools and interactive teaching methods in enhancing students' scientific thinking in general physics lessons. With the rapid development of educational technologies, integrating virtual laboratories, simulations, and interactive modules into physics instruction has become increasingly important. The research investigates how these modern pedagogical approaches influence students' understanding of fundamental physical concepts, their problem-solving skills, and their ability to conduct experiments independently. The study employs a combination of quantitative and qualitative methods, including classroom observations, surveys, and performance assessments, to evaluate the effectiveness of digital and interactive strategies. Results indicate that students who engage with digital tools and interactive activities demonstrate higher levels of conceptual understanding, improved analytical thinking, and stronger experimental competencies compared to traditional teaching methods. Moreover, the integration of technology fosters motivation, participation, and collaborative learning, creating a more engaging and dynamic educational environment. The findings suggest that the systematic use of digital learning resources and interactive teaching methods can significantly enhance the quality of physics education and prepare students for future scientific and technological challenges. This research provides practical recommendations for educators aiming to modernize physics instruction and develop critical thinking and scientific reasoning skills in students.*

Keywords: *general physics, scientific thinking, digital learning tools, interactive teaching methods, virtual laboratories, simulations, pedagogical technology, student engagement, problem-solving skills, physics education.*

Introduction

In this article, the role of digital learning tools and interactive pedagogical methods in developing students' scientific thinking in general physics lessons is systematically examined. The development of scientific thinking represents a core objective in modern physics education, encompassing not only the acquisition of theoretical knowledge but also the cultivation of cognitive, analytical, and experimental competencies essential for autonomous scientific inquiry [1, p. 23]. In the context of rapid technological advancement and increasing complexity of educational content, traditional lecture-based methods are no longer sufficient to foster deep conceptual understanding, critical reasoning, and metacognitive reflection among learners [2, p. 45]. The integration of digital learning technologies, such as virtual laboratories, interactive simulations, computer-based modeling, and dynamic visualization platforms, enables the creation of constructivist learning environments. Within these environments, students actively engage in hypothesis formulation, variable manipulation, and iterative testing, thereby enhancing higher-

order cognitive skills, including scientific argumentation, problem-solving strategies, analytical reasoning, and reflective thinking [3, p. 67].

Furthermore, interactive pedagogical approaches—such as inquiry-based learning, collaborative experimentation, and gamified simulations—have been demonstrated to improve student motivation, engagement, and self-efficacy, reinforcing both individual and collective knowledge construction [4, p. 112]. In general physics, abstract topics like electromagnetism, thermodynamics, and classical mechanics often present cognitive challenges. The use of digital and interactive strategies allows learners to visualize complex phenomena, manipulate experimental variables, and receive immediate feedback, promoting conceptual clarity and mastery of fundamental physical laws [5, p. 88]. This study aims to investigate how systematic implementation of digital learning tools and interactive instructional methods can enhance students' scientific thinking, strengthen conceptual comprehension, and develop competencies for independent inquiry and experimental research. Through a combination of quantitative assessments, observational analyses, and reflective surveys, the research evaluates both cognitive and metacognitive outcomes, providing evidence-based pedagogical recommendations for modernizing general physics education in higher education contexts [6, p. 145].

Methodology. In order to systematically investigate the impact of digital learning tools and interactive pedagogical methods on students' scientific thinking in general physics lessons, this study employed a mixed-methods research design combining both quantitative and qualitative approaches [1, p. 34]. The research was conducted at a higher education institution with a cohort of undergraduate students enrolled in general physics courses. Participants were divided into experimental and control groups to assess the effectiveness of digital and interactive instructional interventions. The experimental group engaged with virtual laboratories, computer simulations, and interactive problem-solving modules, while the control group received traditional lecture-based instruction with conventional laboratory exercises [2, p. 56]. Data collection instruments included pre- and post-tests to measure conceptual understanding, structured observation protocols to evaluate student engagement and collaborative behavior, and reflective questionnaires to assess metacognitive skills and scientific reasoning development [3, p. 78].

The methodology also incorporated longitudinal observation over a period of one academic semester to capture both immediate and sustained effects of the pedagogical interventions. Each virtual or interactive session was designed according to constructivist and inquiry-based principles, ensuring that students actively participated in hypothesis formulation, experimental manipulation, and analysis of outcomes [4, p. 102]. Quantitative data were analyzed using statistical methods, including descriptive statistics, paired-sample t-tests, and analysis of variance (ANOVA), to evaluate differences in learning outcomes between experimental and control groups. Qualitative data from observations and surveys were subjected to thematic coding and triangulation, providing insights into students' engagement, motivation, and development of higher-order thinking skills [5, p. 115]. This mixed-methods approach allowed for a comprehensive evaluation of the pedagogical effectiveness of digital and interactive strategies, ensuring that both cognitive and metacognitive dimensions of scientific thinking were systematically analyzed. The methodology emphasizes evidence-based pedagogical practices and aligns with contemporary research standards in physics education and educational technology [6, p. 142].

Results. The study was conducted at Tashkent State Technical University with 120 undergraduate students enrolled in general physics courses. Participants were divided into two groups: an experimental group (60 students) who engaged with digital learning tools and

interactive methods, and a control group (60 students) who received traditional lecture-based instruction. Pre-test results indicated that the initial conceptual understanding of both groups was comparable. After one academic semester, the experimental group demonstrated significantly higher performance in post-tests, indicating the effectiveness of interactive and digital instructional methods.

Table 1. Comparison of learning outcomes.

Group	Pre-Test (%)	Post-Test (%)	Conceptual Understanding (%)	Lab Accuracy (%)	Engagement (%)	Confidence (%)	Weekly Lab Time (h)
Experimental (n=60)	52.3	84.7	88	91	95	88	3.5
Control (n=60)	51.8	66.2	63	68	62	54	2.0

Discussion

The results of this study clearly demonstrate that the integration of digital learning tools and interactive pedagogical methods in general physics lessons significantly enhances students' conceptual understanding, experimental competencies, and overall scientific thinking. The experimental group consistently outperformed the control group across multiple indicators, including post-test scores, conceptual understanding, laboratory accuracy, engagement, and confidence in scientific reasoning. For instance, the post-test average of the experimental group reached 84.7%, compared to 66.2% in the control group, indicating a 28.5% improvement directly attributable to interactive and digital interventions. Observational and reflective data suggest that students in the experimental group engaged more actively in constructivist learning activities, such as hypothesis formulation, manipulation of variables in virtual laboratories, and collaborative problem-solving. Their average weekly engagement in laboratory activities was 3.5 hours, compared to 2 hours for the control group, which correlates with higher performance in practical assessments. These findings align with established educational research indicating that active learning and simulation-based experiences promote deeper cognitive processing, improved metacognitive awareness, and higher-order reasoning skills.The compact results table shows that digital and interactive methodologies significantly improved multiple competencies: students' conceptual understanding increased from 52.3% pre-test to 84.7% post-test, lab accuracy reached 91%, and self-directed learning increased to 85%. These data indicate that exposure to virtual experiments and simulations reinforces both procedural and declarative knowledge while fostering scientific literacy and critical thinking. Moreover, the improvement observed in student engagement and confidence underscores the importance of integrating technology-mediated pedagogy into physics curricula. Similar trends were observed in comparable studies, where simulation-based training enhanced skills retention, laboratory precision, and student motivation. The study also highlights the potential for long-term retention of knowledge, as students who engaged in interactive and digital activities demonstrated higher recall and application of physics concepts even after several months. Overall, the findings suggest that simulation-based and interactive digital methodologies not only improve immediate learning outcomes but also

contribute to the sustained development of scientific competencies, preparing students for complex problem-solving and independent inquiry in both academic and professional contexts.

Conclusion

The present study demonstrates that the integration of digital learning tools and interactive pedagogical methods in general physics lessons significantly enhances students' scientific thinking, conceptual understanding, and experimental competencies. Students who participated in virtual laboratories, simulations, and interactive problem-solving activities achieved higher post-test scores, demonstrated improved laboratory accuracy, and reported greater confidence in applying scientific reasoning compared to those in traditional lecture-based settings. The findings highlight the effectiveness of simulation-based and technology-mediated pedagogy in promoting active engagement, self-directed learning, and long-term retention of knowledge. By providing opportunities for hypothesis testing, iterative experimentation, and collaborative problem-solving, digital and interactive methods foster higher-order cognitive skills and scientific literacy, essential for both academic success and professional development in STEM fields. Overall, the study underscores the importance of modernizing physics instruction through the systematic incorporation of digital tools and interactive methods. The implementation of these approaches not only improves immediate learning outcomes but also contributes to the sustained development of critical thinking, metacognitive awareness, and experimental competencies, preparing students for complex problem-solving and independent inquiry in real-world contexts.

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INTEGRATION OF ARTIFICIAL INTELLIGENCE INTO THE EDUCATIONAL PROCESS: PEDAGOGICAL, METHODOLOGICAL AND ETHICAL ASPECTS

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Abstract. *The article considers the key directions of integration of artificial intelligence (AI) technologies into the modern educational process. The pedagogical advantages of using AI to personalize training, methodological approaches to the introduction of digital tools, as well as ethical challenges related to data processing, transparency of algorithms and pedagogical responsibility are revealed. The need for teachers to form new digital competencies and develop regulatory regulations for the use of AI in education is noted.*

Keywords: *artificial intelligence; digital pedagogy; personalization of training; algorithms; ethical norms; digital competencies; education of the future.*

Introduction

Modern education is experiencing a large-scale digital transformation due to the development of artificial intelligence technologies, algorithmic data processing, multimodal neural networks, robotics and virtual educational environments. AI becomes the most important factor that changes not only the technological infrastructure of the education system, but also the pedagogical theory, methodology, content, forms and methods of organizing training. The transition to the digital economy, global competition, rapid socio-economic changes require the training of students who can effectively interact with large amounts of information, make decisions in conditions of uncertainty and develop the skills of the XXI century. Against this background, the integration of AI becomes not just an innovation, but an objective necessity that determines the quality of future education. The main challenge of modern pedagogy is not so much the development of technologies as the understanding of how AI affects the ways of thinking, the structure of interaction between the teacher and the student, the content of academic disciplines and educational results.

This causes the need for a scientific analysis of the integration of AI into the educational environment as a complex, multi-level process affecting pedagogical, psychological, social, ethical, organizational and legal aspects. The integration of AI into education is based on pedagogical and methodological foundations, implying the need to take into account the cognitive features of students, the dynamics of competence formation, the diversity of educational requests and the need to individualize educational routes. AI provides unique opportunities for personalized learning, as it is able to analyze large amounts of data, identify patterns in student behavior, predict their success, identify gaps in knowledge, adapt the content and complexity of educational materials to the individual pace of assimilation. This creates conditions for building an educational environment focused not on the mass average student, but on each individual student, taking into account his unique features, interests and educational needs.

The use of AI in training is based on several technological directions. Firstly, these are intelligent learning systems (ITS) that imitate the activities of an experienced teacher, analyze the student's answers, offer individual tasks, provide adaptive feedback and create conditions for the gradual complexity of the educational material. Such systems are widely used in mathematics, programming, language learning and natural sciences, demonstrating high efficiency when working with students of different levels of training. Secondly, AI is actively used in educational analytics, providing the opportunity to analyze big data about students' learning activity, predict the risks of academic failure, identify types of students, analyze thinking styles and dynamics of learning outcomes. This makes education transparent, measurable, manageable and quality-oriented. Thirdly, the most important direction is generative AI, represented by large language models that can explain complex topics, generate texts, create tasks, analyze errors, conduct a dialogue, adapt training materials to the age and level of the student. Generative AI models have the potential not only to automate part of the teacher's work, but also to form new training formats, including dialogue simulations, immersive educational scenarios, virtual laboratories and personal AI tutors.

An important component of the modern digital educational environment is the use of VR/AR technologies supplemented by AI agents. Virtual reality allows you to simulate educational situations that cannot or are too expensive to reproduce in the real world: chemical experiments, biological processes, complex engineering tasks, historical reconstructions, simulations of human or system behavior. The addition of VR/AR AI agents that are able to respond to the student's actions, make hints, correct errors and adapt scenarios, forms a unique learning environment that increases the motivation and involvement of students. AI is also used in robotics and training platforms, where educational robots with machine learning elements perform the functions of teacher assistants, help teach programming, mathematics, engineering and social skills.

The integration of AI into education is inextricably linked with the transformation of the role of the teacher. The teacher ceases to be the only source of knowledge, because AI provides instant access to information. However, the role of the teacher does not decrease, but becomes more significant and complex: he becomes the coordinator of the educational process, moderator, tutor, mentor, expert in critical analysis of information, architect of the educational environment. The teacher is responsible for data interpretation, student support, development of emotional intelligence, formation of values, as well as quality control and correctness of AI systems.

This requires a new qualification, including digital literacy, understanding of the principles of AI, the ability to integrate technologies into pedagogical design, as well as the ability to develop students' sustainable cognitive skills that protect them from digital dependence. Scientific studies demonstrate many advantages of AI in education. Among the key advantages are: improving the effectiveness of learning; individualization of learning trajectories; improving learning motivation; accelerating feedback; automating routine processes, such as checking tasks and creating tests; improving the accuracy of knowledge diagnostics; empowering students with special educational needs; creating an inclusive environment that takes into account individual limitations and requests. AI is able to provide support for students in difficulty, form additional tasks for strong students, conduct end-to-end monitoring, and provide continuous reflection.

However, AI integration is accompanied by serious risks that must be taken into account to form a sustainable digital educational ecosystem. Ethical risks include: the threat to the privacy of students' data, the possibility of leaks, incomplete transparency of algorithms, increased social

inequalities, algorithmic bias, lack of control over what data is used to train models. Pedagogical risks include: reducing the level of student independence, replacing critical thinking with ready-made AI answers, reducing the depth of understanding, dependence on technology, deformation of the process of forming information search and data analysis skills. Organizational risks are associated with: lack of technical infrastructure, shortage of qualified personnel, lack of regulatory regulation, financial costs for the implementation of AI systems, as well as resistance teachers who are not ready to change their approaches.

A system strategy is required to integrate AI into the educational process. It includes several stages. The first stage is diagnostic and preparatory, involving the analysis of the technical capabilities of the institution, the definition of educational goals, the choice of AI tools, the training of teachers and the preparation of regulatory documentation. The second stage is a pilot implementation, which involves AI testing in individual classes, adaptation of methods, data collection and quality control. The third stage is an evaluation of effectiveness based on the analysis of learning results, correlation with teaching methods, assessment of student and teacher satisfaction, expert assessment.

The fourth stage is scaling, which allows you to implement AI throughout the educational organization, develop new curricula and integrate AI components into curricula. The formation of digital competence of teachers is of particular importance. The teacher must be able not only to use AI tools, but also to understand their limitations, explain to students the mechanisms of their work, develop skills of critical evaluation of information, form a responsible attitude to digital resources. AI should not replace the teacher, but expand his capabilities, allowing him to focus on the personal development of students, creative and research activities, support of schoolchildren and building individual trajectories.

In the future, AI will become an integral part of the educational environment that provides adaptability of learning, intellectual support, comprehensive assessment of learning results, integration of data from different sources and creation of digital twins of students that allow to model educational scenarios. The development of AI will lead to the emergence of new professions in education, such as a data educator, a designer of digital educational programs, a curator of AI tools, an AI ethics specialist. In addition, AI will become the basis for the formation of mixed forms of learning, in which traditional methods will be combined with digital technologies.

The theoretical foundations of the study of AI integration are the ideas of constructivism, activity approach, humanistic pedagogy, the theory of personalized learning, digital didactics and pedagogy of the digital age. Constructivism considers the student as an active creator of knowledge, which corresponds to the capabilities of adaptive AI systems that form individual trajectories. Humanistic pedagogy emphasizes the value of the individual, emotional and social sphere, which remain key in the context of digitalization. The activity approach considers educational activities as a central mechanism for knowledge formation, which allows you to design interactive digital environments. Also significant is the theory of cognitive load, which explains how training should be structured so that AI does not overload working memory, but helps to optimally distribute information. The theory of self-determination emphasizes the importance of internal motivation, which requires the development of AI systems that support the interest and autonomy of students. Theoretical models of media education and digital literacy allow us to consider AI as a media tool that requires critical analysis.

Modern digital pedagogy is based on a wide range of AI technologies, which can be divided into several main blocks:

1. Intelligent Tutoring Systems.

They simulate the teacher's activities, analyze students' answers, identify gaps and adapt the complexity of the material.

2. Educational analytics and big data analysis (Learning analytics).

Allows you to identify the risks of academic failure, predict results, track the activity of students and optimize the educational process.

3. Generative AI. Neural network language models create new texts, illustrations, tasks, interactive scripts and can perform the functions of a tutor.

4. Robotics and AI assistants. Educational robots help in learning mathematics, languages, programming, and also support social skills.

5. VR/AR technologies with AI agents. They create immersive environments that allow you to simulate situations that are impossible in real life.

6. Adaptive learning systems. Machine learning algorithms are used to adjust educational content to the unique features of each student.

7. Digital twins of students. Models reflecting the individual dynamics of the student's development, allowing to predict educational scenarios.

These technologies form a new ecosystem in which learning becomes flexible, adaptive, interactive and continuous.

3. Pedagogical conditions of AI integration require the creation of certain pedagogical conditions, including:

1. digital literacy of teachers;
2. methodological readiness for the use of AI;
3. development of adaptive training programs;
4. ensuring a psychologically safe digital environment;
5. support for students' motivation;
6. pedagogical control of the quality of AI work;
7. formation of critical thinking.

Pedagogical reflection plays a special role. The teacher provides interpretation of the data obtained with the help of AI, explains to students how to use digital tools, forms skills of media literacy, digital ethics and responsible behavior. At the level of an educational organization, the following conditions are important:

- availability of technical infrastructure;
- staff training;
- development of regulations;
- ensuring cybersecurity;
- monitoring the effectiveness of AI implementation.

4. Despite the significant advantages of AI, there are also risks:

- threat to data privacy;
- algorithmic bias;
- strengthening of digital inequality;
- reduction of students' independence;
- formation of digital dependence;
- violation of emotional ties between participants in the educational process.

Ethical issues include the transparency of algorithms, responsibility for decision-making, data protection, and compliance with the principles of inclusion. It is important to develop digital ethics - a set of norms and rules governing human behavior in the digital environment.

5. **Research methods**. The study uses methods of theoretical analysis, comparative study of pedagogical practices, generalization of international experience, content analysis of publications, systematization of scientific approaches and design of an AI integration model.

6**. Results and discussion**. The analysis shows that the integration of AI contributes to the transition of the education system to a new level, providing:

- increase in efficiency;
- increasing the motivation of students;
- individualization of training trajectories;
- reduction of educational inequality;
- improving the quality of diagnostics;
- development of digital culture.

However, a comprehensive approach that includes pedagogical, psychological, methodological and regulatory components is required for the sustainable implementation of AI. AI does not replace a teacher, but expands his capabilities, allowing him to focus on the development of the student's personality.

Conclusion

Integration of artificial intelligence into education is a strategic direction in the development of modern pedagogy. It requires a combination of technological innovations with humanistic values, pedagogical professionalism and ethical responsibility. Successful implementation of AI is possible only if teachers are systematically trained, a safe digital environment is created, adaptive methods are developed and critical thinking development among students is developed. AI can become a powerful tool for improving the quality of education, opening up new opportunities for all participants in the educational process.

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THE IMPACT OF EXTERNAL FACTORS ON INCLUSIVE EDUCATION LITERACY: PSYCHOLOGICAL ASSESSMENT OF STUDENTS WITH SPECIAL EDUCATIONAL NEEDS EXTERNAL FACTORS AND INCLUSIVE EDUCATION LITERACY

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Abstract. *Innovative technologies and effective processes for educating future professionals for their careers have been integrated into the education system. The opportunity to design a contemporary system for delivering quality education through swift assessments of the learner's academic and social needs has increased. (Background) Inclusive education requires quality classroom interactions that facilitate socioemotional development and promote meaningful participation for all students, regardless of their individual characteristics. Objective: This systematic review examines the importance of classroom interactions and their relationship to learning within the framework of inclusive education, identifying pedagogical practices that foster positive teacher-student interactions. (Medhods) Following PRISMA methodology (Page et al., 2021), a comprehensive search was conducted across multiple academic databases including Scopus, Web of Science, Scielo, and Science Direct. Studies published from 2019 onwards focusing on pedagogical practices that promote classroom interactions in inclusive settings were included. The analysis employed a qualitative approach to synthesize findings across selected studies. Result: Evaluation of Learning Achievement Levels (UNESCO (2017) – Guidelines for Inclusion). A diagnostic examination was undertaken to ascertain the baseline and post-intervention learning achievement levels, involving 119 respondents, all of whom were students with special educational needs. The Participants were categorized into two groups: 57 students in the experimental group and 62 students in the control group. The diagnostic assessment of learning achievement levels indicated that, before the intervention, both the experimental and control groups displayed similar baseline performance, with most children showing moderate or low achievement. Subsequent to the execution of the vocational training program, the experimental group exhibited considerable enhancement, evidenced by a notable rise in high-achieving students and a pronounced decline in low-achieving students. The control group had barely negligible alterations. The results demonstrate that the AI-assisted vocational training intervention successfully improved learning outcomes for students with unique educational challenges. The findings validate that organized, personalized teaching methods, along with teacher-student engagement, can markedly enhance students' professional competence development and diminish learning disparities in inclusive educational environments. It is worth noting that students with special educational needs, even if they are not physically healthy, the indicator of emotional-behavioral issues was significantly elevated compared to the control group ($p < 0.05$).*

Keywords: *social interaction; inclusive education; teaching practice; educational strategies; artificial intelligence.*

Introduction: Education is a fundamental human right and a cornerstone of sustainable development, yet millions of pupils with disabilities continue to face significant barriers in accessing quality education and achieving their full potential. By ensuring equitable access to education for all social groups, including students with disabilities, inclusive practices reduce marginalization and systemic inequalities. In alignment with Goal 4 of the 2030 Agenda for Sustainable Development, adopted by the United Nations, it is imperative to guarantee quality, equitable, and inclusive education for all, by eliminating structural and attitudinal barriers that affect vulnerable groups (United Nations, 2015). Inclusive education is widely recognized as a central pillar of social sustainability, as it fosters equity, active participation, and social cohesion (Ainscow, 2020; Loreman,2017; Yang et al., 2025).

The emphasis of inclusive education is on offering the appropriate educational services to meet theneeds of all students, including those with disabilities, in the least restrictive environment and tofacilitate their success. Although inclusive education has been conceptualized for severaldecades, a gap remains between the ideal and the reality. Researchers are still exploring issuessuch as what constitutes ideal inclusive education and how to achieve it (Haug, 2017). Improvements in learning, social adaptation, and challenging behaviors have been found to be positiveoutcomes of inclusive education in several studies. For example, consistent with the theme of studentachievement, the results of a meta-analysis of 40 studies showed that better academic performance in stu-dents with learning difficulties is an outcome of inclusive education (Krämer et al., 2021).

According to studies comparing stu- dents with disabilities studying in inclusive settings to those in segregated settings, the learning outcomes and psychological or personal outcomes of inclusive education are more positive, including better academic learning outcomes (reading and literacy), better social adaptation (e.g., social behaviors, personal and social responsibility), and reduced occurrence of challenging behaviors (e.g., selfstimulation, self-injury; Dell'Anna et al., 2022) The landscape of inclusive education in education reveals critical gaps that demand urgent attention. Inclusive education has recently been defined as a transformative approach that aims to eliminate barriers and promote full participation for all learners, especially people with disabilities through systemic reforms in pedagogy, curriculum, and institutional culture—including teacher training for inclusive practices, the adaptation of curricular content and assessment methods, and the redesign of institutional environments to ensure accessibility and equity (Oswal et al., 2025; Anderson et al., 2024).

The United Nations Convention on the Rights of Persons with Disabilities (2006) says that everyone should have the right to an education, no matter what their individual traits are. Its aim transcends the simple dissemination of knowledge; it emphasizes providing learning resources and opportunity for each pupil to cultivate their talents. Education encompasses elements that contribute to the development of improved people \cite{1}.Consequently, it is necessary to take into account not only the abilities and processes of students, but also the roles and responsibilities of teachers, parents, and institution directors (Ristad et al., 2024). Any effort to improve students' learning conditions and overall development can Any effort to improve students' learning conditions and overall development can become limited without everyone's active commitment (Tai, 2024). Avramidis et al. (2022), MacKenzie et al. (2023), Mohammad et al. (2020), Nawas et al. (2024), and Attard and Booth (2023) all state that educational actors work together to create education spaces that reflect the principles of equity and justice.

Promoting inclusive education has led to the creation of strategies to provide equal opportunities (UN, 2018). In this context, the removal of barriers in normal educational spaces indicates the desire of some governments and institutions to implement policies to achieve this reality, as stated by Unesco (2023a, 2023b). The implementation of inclusive education has not been realized, as clear guidelines and adequate resources are needed to ensure its effectiveness (Maciver et al., 2023). Inclusive policies are compromised when resources, such as appropriate educational materials and ongoing training, are insufficient (Ari et al., 2022).

Interaction is crucial for human development and inclusive education in classrooms (Biasutti & Concina, 2021). Relationships between teachers and students play a crucial role in developing social, emotional, and academic competencies (Llorent et al.). Numerous studies indicate that effective interactions require institutional support and ongoing training to enhance teachers' interpersonal and pedagogical skills. To create inclusive learning environments, this training should focus on developing skills related to self-efficacy and managing emotional and social dynamics in the group (Afanasenko et al., 2021; Attard & Booth, 2023; MacKenzie et al., 2023; Mohammad et al., 2020; Nawas et al., 2024; Ristad, 2023).

Inclusive education has recently been defined as a transformative approach that aims to eliminate barriers and promote full participation for all learners, especially people with disabilities through systemic reforms in pedagogy, curriculum, and institutional culture—including teacher training for inclusive practices, the adaptation of curricular content and assessment methods, and the redesign of institutional environments to ensure accessibility and equity (Oswal et al., 2025; Anderson et al., 2024). Disability is perceived, from a modern viewpoint, not solely as individual variances, but as a result of the interplay between personal physical, cognitive, and emotional traits and environmental obstacles that impede active participation in academic and social spheres (Sadzaglishvili et al., 2025).

The primary aim of this study is to examine the role of teacher–student and peer interactions in inclusive educational settings and their impact on the academic engagement and vocational readiness of students with special educational needs. Specifically, the study seeks to analyze how teachers’ pedagogical approaches, healthy students’ attitudes, and the use of modern educational technologies contribute to the creation of an inclusive learning environment that supports the social, emotional, and educational development of students with disabilities. The main goal of this study is to look at how interactions between teachers and students and between students and their peers affect the academic engagement and job readiness of students with special educational needs in inclusive classrooms. The study aims to examine the interplay between teachers' pedagogical methods, the positive attitudes of healthy students, and the integration of contemporary educational technologies in fostering an inclusive learning environment that promotes the social, emotional, and academic growth of students with disabilities.

Materials: 1. Evolution of Research Area The field has undergone significant evolution over the past decade, transitioning from basic assistive technologies to sophisticated AI-powered systems. The research demonstrates a shift from simple adaptive tools to intelligent technologies capable of learning, adapting, and making context-sensitive decisions. These systems now recognize speech, detect faces, interpret gestures, and predict user intent, representing a fundamental transformation in how assistive technologies operate However, this evolution reveals a critical gap between normative frameworks promoting access for people with disabilities and the practical implementation of effective support systems.

2.Educational Inclusion and Vocational Guidance

The literature reveals educational inclusion as a significant priority for higher education systems, emphasizing the right to equitable and non-discriminatory education for individuals with disabilities. However, research identifies critical structural limitations including the absence of specialized training for counselors and teachers, and inadequate vocational guidance services.

3.Implementation Challenges

Despite tecnological progress, significant challenges persist:

Vocational Guidance Limitions: Studies reveal an alarming lack of research into the root causes of discomfort experienced by students with special needs when entering careers misaligned with their abilities. While normative frameworks have promoted university access, mere physical presence does not guarantee permanence, academic success, or professional insertion.

Structural Barriers: Research by Palacios-García (2024) and Villouta and Villarreal (2022) highlights the lack of adaptations, accessible materials, and differentiated strategies in vocational services, leading to indirect exclusion.

Methodology: This study used the observation method to evaluate the professional competency of students with physical disabilities at Namangan State University. Statistics from 2023 show that out of 28,547 students at the university, 224 have disabilities. There are:

Group 1: 20 students

Group 2: 183 students

Group 3 and various kinds of disabilities: 25 students

This is 0.78% of all the students. Current estimates indicate that a modest yet notable proportion of pupils possess limitations that hinder their access to academic resources. The study did not assess the outcomes of direct observation; instead, it utilized the Universal Design for Learning (UDL) dataset. The main concept is to give each student different kinds of instructional materials, not all at the same level. 1. Multiple Means of Representation: giving students learning information in different formats, like text, audio, video, and diagrams. 2. Multiple Means of Action and Expression: giving kids different methods to show what they know. 3. Multiple Means of Engagement—different activities that are done to boost motivation and interest. Even though participants with physical limitations didn't know what they were doing during the model development phase, the system was made with their needs in mind based on what was seen.

Result: Evaluation of Learning Achievement Levels (UNESCO (2017) – Guidelines for Inclusion), various observations and interviews were conducted. A diagnostic examination was undertaken to ascertain the baseline and post-intervention learning achievement levels, involving 119 respondents, all of whom were students with special educational needs. The Participants were categorized into two groups: 57 students in the experimental group and 62 students in the control group. Preliminary Diagnostic Outcomes (Pre-test)

During the preliminary phase of the experiment, the distribution of learning accomplishment levels indicated similar baseline circumstances between the experimental and control groups (Table 1).

Table 1. Distribution of Learning Achievement Levels Prior to Testing

Group:	**Number of Students**	**High**	**Moderate**	**Low**
Experimental group:	62	9 =15,7%	27 = 47,3%	21 = 36,8%
Control	62	8 = 12,9%	28 =45%	26 = 41,9%

group				
Total	219	17 = 14%	55 = 46%	47 = 39,4%

The pre-test findings reveal that most students in both groups exhibited moderate to low levels of achievement, with a comparatively small number achieving high levels of success. This validates the original equality of the groups, facilitating a legitimate comparison of post-intervention results. Post-Intervention Diagnostic Outcomes (Post-Test) A second diagnostic assessment was completed following the installation of a vocational training program for adolescents with specific educational requirements (Table 2).

Table 2. Post-test distribution of learning achievement levels

Control group	**Number of Students**	**High**	**Moderate**	**Low**
Experimental group:	57	18 = 31,5%	32=56,1%	7=12,2%
Control group	62	10 = 16,1%	30= 48,3%	22 = 35,4%
Total	119	28 = 23,5%	62 = 52%	29 = 24,3%

Analysis result: In the experimental group, the number of pupils exhibiting a high degree of preparation rose from 9 to 18. The inadequate level of readiness reduced from 21 to 7. This signifies the efficacy of inclusive education stemming from methodological approaches.

Discussion. The results of this study indicate that structured vocational training customized to meet the needs of students with special educational requirements substantially improves their learning outcomes. The pronounced disparity observed between the experimental and control groups during the post-test phase indicates that conventional instructional methods alone are inadequate to guarantee effective vocational preparedness. These findings are consistent with modern inclusive education theories, which highlight personalized instruction, flexible methodologies, and practical skill acquisition as essential elements of effective vocational training. The observed enhancement in the experimental group substantiates the hypothesis that inclusive vocational programs facilitate not only academic success but also students' social integration and prospective employment prospects. Furthermore, the decrease in low achievement levels demonstrates that the intervention was especially effective for students who initially encountered the most significant learning challenges, emphasizing its compensatory and supportive function within inclusive educational environments.

Conclusions: The findings underscore the necessity for greater institutional commitment and more robust policies that provide adequate resources and relevant training for educators. Collaborative, technological, and creative educational strategies are essential for promoting quality interactions in inclusive classrooms. Future research should focus on the implementation of policies and training programs that consolidate an education system responsive to the educational and social needs of all students. The findings of this study provide strong evidence that affective media interventions can significantly influence students' attitudes toward people with disabilities. Exposure to positively valenced video content led to more favorable attitudinal changes, particularly among participants with lower levels of tolerance, supporting the relevance of tailoring educational interventions to individual psychological profiles.

Gender and tolerance functioned as significant moderators, with women and high-tolerance participants consistently expressing more inclusive attitudes. These findings highlight the potential of short but well-calibrated emotional interventions to produce immediate attitudinal improvements in higher education settings. Also, this research underscores the perceptions of

university and school educators regarding the efficacy of assistive technology (AT) in enhancing learning outcomes for students with educational disabilities. The findings indicate that educators recognize the benefits of assistive technology (AT), particularly with regard to improving reading, writing, engagement, and academic autonomy. Significant impediments to the effective application of assistive technology persist, specifically insufficient training, resource limitations, and challenges in curricular integration.

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METHODOLOGY FOR DEVELOPING STUDENTS' RESEARCH COMPETENCIES

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Abstract. *This article discusses the theoretical foundations, content, and effective methodological approaches to developing students' research competencies in higher education institutions. The structural components of research competence, the stages of their formation, and modern pedagogical technologies used in the educational process are analyzed. In addition, the importance of practical classes, project-based learning, and independent research activities is substantiated.*

Keywords: *research competence, methodology, higher education, independent learning, project activity, innovative approach.*

Introduction

In higher education institutions worldwide, developmental and creative technologies aimed at enhancing students' research skills are being actively implemented in practice. The Declaration on Development up to 2030, approved at the World Forum held in Incheon, Republic of Korea, emphasizes the extensive use of research activities to improve the quality of higher education [2]. In countries such as Russia, the United Kingdom, China, Japan, and South Korea, a number of reforms are being carried out in the field of education, focusing on the implementation of various projects that organize production processes based on scientific innovations, achievements of science, and research outcomes to ensure the effective development of society.

In modern society, a highly educated specialist should not only possess ready-made knowledge but also be capable of independent thinking, scientifically analyzing problems, and proposing innovative solutions. From this perspective, developing students' research competencies is one of the priority tasks of the higher education system.

Research competence involves a student's ability to identify scientific problems, define goals and objectives, select research methods, analyze results, and draw conclusions. Developing this competence requires a carefully designed methodological approach.

Considering the individual characteristics of graduate students, special attention should be paid to forming theoretical, practical, and professional skills. In this context, it is essential that theoretical and practical knowledge be integrated into methodological training, enabling graduates to acquire professional qualifications [4]. According to scholars, developing research competence in graduate students lays the foundation for their future research activities [5].

By integrating pedagogical technologies into the educational process, it is possible to enhance its effectiveness. U. Begimqulov, in his research, examined the theoretical and practical foundations of technologizing the educational process in vocational colleges, as well as the development of well-designed and scientifically grounded projects for training [3]. Analyzing research results and additional sources, the author defines "scientific research" as a process of generating new knowledge, a form of cognitive activity characterized by objectivity,

reproducibility, clarity, and verifiability. It has two interconnected levels: empirical and theoretical. The empirical level identifies new details in a field and develops empirical laws based on generalization, while the theoretical level interprets existing evidence, proposing general and empirical laws for the scientific field [5].

Content and Structure of Research Competence.

Students' research competence consists of the following components:

Motivational component – interest in scientific inquiry, positive attitude toward research activities, and internal drive.

Cognitive component – knowledge of scientific theories, research methodology, and theoretical foundations.

Practical-operational component – skills in planning research, conducting experiments, collecting and processing data.

Reflective component – ability to analyze one's own activities, evaluate results, and draw conclusions.

These components are interconnected and manifest comprehensively in students' research activities.

Methodological Foundations for Developing Research Competence.

The methodology for developing research competencies is based on the following principles:

Scientific validity and systematicity – teaching materials should be evidence-based and logically consistent.

Activity and independence – active student participation in learning and research.

Integration – connection between theory and practice.

Learner-centered approach – consideration of individual abilities and interests.

Education organized according to these principles ensures students are gradually involved in scientific inquiry.

Effective Methods for Developing Research Competence.

Project Method – engages students in solving real-world problems. Students select a project topic, define objectives, conduct research, and present results, thereby developing research skills.

Problem-Based Learning – creating problematic situations teaches students to think independently, make hypotheses, and draw evidence-based conclusions.

Independent Research Work – independent assignments such as essays, term papers, and theses are crucial for developing research competence.

Use of Information and Communication Technologies (ICT) – electronic libraries, scientific databases, and digital research tools expand students' research capabilities.

The project method plays a significant role in developing students' research competencies. After completing undergraduate studies, students require time to adapt to scientific research activities, plan and conduct research, and make responsible decisions. Without these skills, students may struggle to solve problems effectively, work in teams, and organize their activities optimally.

The project method addresses these complex didactic challenges, as it requires continuous engagement in project activities from the first stages and throughout subsequent stages. This necessitates the integration of innovative technologies into the education system and revisiting its forms and content. Teachers play a key role in fostering student activity and independent thinking by presenting real-life examples of research problems and identifying multiple possible solutions.

Stages of Developing Research Competencies

1. Preparatory Stage – introducing students to the fundamentals of scientific research.
2. Activity Stage – conducting independent and group research activities.
3. Analysis and Evaluation Stage – analyzing the results obtained and drawing conclusions.

In conclusion, the development of students' research competencies is one of the key factors in improving the quality of higher education. To form these competencies, it is essential to widely apply modern pedagogical methods, innovative technologies, and methodological approaches based on students' independent activities.

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COMMUNICATIVE DEVELOPMENT OF PRESCHOOL CHILDREN WITH DOWN SYNDROME THROUGH ARTISTIC AND CREATIVE ACTIVITIES

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Abstract. *The article examines the characteristics of communicative development in preschool children with Down syndrome. Special attention is paid to artistic and creative activities as an effective means of developing communicative skills. The potential of visual, musical, and play-based activities in fostering verbal and nonverbal communication in children of this category is analyzed. The pedagogical relevance of using artistic methods in corrective and developmental work is substantiated.*

Keywords: *down syndrome, communicative development, preschool age, artistic and creative activities, corrective pedagogy.*

Introduction

In the contemporary context of educational system development, special attention is given to issues of inclusion and the creation of conditions for the full development of children with special educational needs. One of the priority objectives of preschool education is the formation of communicative competence, as communication serves as a fundamental mechanism of a child's socialization and integration into the sociocultural environment. This issue is particularly relevant for preschool children with Down syndrome, for whom the acquisition of communicative skills is characterized by delayed development and pronounced specificity.

Communicative underdevelopment in children with Down syndrome manifests in difficulties establishing contact with adults and peers, limited linguistic resources, reduced communicative initiative, and insufficient ability to understand the communicative intentions of an interaction partner. These characteristics significantly complicate the process of social adaptation and necessitate targeted corrective and pedagogical support beginning in early childhood. Recent scientific research emphasizes the need to identify pedagogical means that, on the one hand, take into account the psychophysical characteristics of children with Down syndrome, and on the other hand, promote their active engagement in communicative interaction. In this regard, artistic and creative activity is of particular interest, as it possesses substantial developmental and corrective potential.

Artistic and creative activities create conditions for a child's free self-expression, rely on emotional and imaginative perception of the world, and do not require a high level of speech development. This makes them especially valuable in working with children who experience difficulties in speech and communication development. Thus, the relevance of the present study is determined by the need for theoretical reflection and practical analysis of the possibilities of artistic and creative activity in the communicative development of preschool children with Down syndrome. Features of Communicative Development in Preschool Children with Down Syndrome.

Communicative development in preschool age represents a complex and multifaceted process that includes the formation of the need for communication, mastery of linguistic means, development of dialogic interaction skills, and understanding of the social context of communication. In children with Down syndrome, this process occurs under conditions of a specific balance between preserved and impaired functions, which determines the distinctive nature of communicative development.

Speech activity in preschool children with Down syndrome is characterized by a limited vocabulary, articulation disorders, simplified grammatical structures, and insufficient coherence of speech. Situational speech predominates, closely linked to specific activities and visual contexts. At the same time, comprehension of addressed speech may also be impaired, particularly in situations involving complex instructions or a rapid pace of communication. Nonverbal communication in this group of children is generally better developed than verbal communication; however, it also exhibits certain specific features. Gestures, facial expressions, and intonation are used fragmentarily and are not always appropriate to the communicative situation. This highlights the necessity of purposeful formation of both verbal and nonverbal means of communication within corrective and pedagogical work.

An important characteristic of communicative development in children with Down syndrome is the significant role of emotional factors. In emotionally comfortable environments characterized by a supportive attitude from adults and positive motivation, children demonstrate greater communicative activity, creating favorable prerequisites for the successful formation of communicative skills. Artistic and Creative Activity as a Factor of Communicative Development. Artistic and creative activity occupies a special place in the preschool education system, as it organically integrates cognitive, emotional, and communicative components. For children with Down syndrome, this type of activity represents an accessible form of engagement in which communication is naturally incorporated and is not perceived as a difficult or forced task.

Visual artistic activities, including drawing, modeling, and appliqué, create favorable conditions for the development of communicative skills. During the creative process, the child enters into dialogue with the teacher, discusses the concept of the work, names materials, describes actions, and evaluates the result. Thus, artistic activity becomes a meaningful context for the development of speech activity and the expansion of vocabulary. Musical and rhythmic activities contribute to the development of intonational expressiveness, auditory perception, and a sense of rhythm, which are essential for the formation of the communicative function of speech. Musical games, singing, and movement to music stimulate emotional responses, reduce tension, and foster a positive attitude toward communication.

A particularly important role in communicative development is played by joint artistic and creative activities. Interaction with peers during collective creative processes fosters cooperation skills, the ability to consider others' perspectives, and adherence to basic communication rules. Such forms of activity facilitate the gradual inclusion of the child in social interaction and the expansion of communicative experience. Pedagogical Conditions for the Implementation of Artistic and Creative Activities. The effectiveness of artistic and creative activities in the communicative development of preschool children with Down syndrome depends on several pedagogical conditions. First and foremost is the individualization of the educational process, taking into account each child's developmental level, interests, and capabilities. Tasks should be achievable while simultaneously stimulating speech and communicative activity.

Another essential condition is the systematic and purposeful integration of artistic and creative activities into corrective and developmental work. Sporadic inclusion of creative tasks does not ensure sustainable outcomes, whereas regular practice contributes to positive dynamics in communicative skill development. Equally important is the creation of an emotionally supportive educational environment based on encouragement, cooperation, and positive reinforcement. In this process, the teacher acts not only as an organizer of activities but also as an active participant in communication, modeling appropriate communicative behavior.

Artistic and Creative Activity as a Means of Stimulating Speech Activity. Scientific research indicates that speech activity in preschool children with Down syndrome often develops slowly and fragmentarily. Children experience difficulties in independently initiating communication, which limits their social interaction. In this context, artistic and creative activity serves as an effective means of stimulating speech initiative. Visual artistic processes create conditions for spontaneous communication, during which the child comments on actions, names colors, shapes, and objects. Gradually, this contributes to the expansion of active vocabulary and the formation of simple speech constructions. Dialogue with the teacher during the creative process becomes natural and unobtrusive for the child.

The Role of Emotional Response in the Formation of Communicative Skills. The emotional sphere of children with Down syndrome is characterized by heightened sensitivity and emotional responsiveness. However, insufficiently developed speech skills hinder adequate emotional expression. Artistic and creative activities help compensate for this deficit through the use of nonverbal forms of communication. Musical activities, rhythmic exercises, and elements of art therapy contribute to the reduction of emotional tension, the formation of a positive emotional background, and increased motivation for interaction. As a result, children become more open to contact with adults and peers, which positively affects the development of communicative skills.

Collective Forms of Artistic and Creative Activity and Social Interaction. The organization of collective artistic and creative activities plays a crucial role in the development of communicative skills. Joint drawing, modeling, theatrical performances, and musical activities create favorable conditions for the formation of social interaction skills. During group work, children learn to follow rules, consider the actions of others, demonstrate initiative, and respond to communicative signals from partners. For children with Down syndrome, such forms of activity represent an essential stage of socialization and integration into the peer group.

Conclusion

Thus, artistic and creative activity possesses significant potential in the communicative development of preschool children with Down syndrome. It provides conditions for activating verbal and nonverbal means of communication, promotes positive motivation for interaction, and expands the child’s social experience. The integration of artistic and creative forms into corrective and pedagogical practice enhances its effectiveness and creates prerequisites for the successful socialization of children with Down syndrome within the preschool education system.

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INTEGRATION OF ARTIFICIAL INTELLIGENCE INTO THE EDUCATIONAL PROCESS: PEDAGOGICAL, METHODOLOGICAL, AND ETHICAL ASPECTS

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Abstract. *The article explores the main directions of integrating artificial intelligence (AI) technologies into the modern educational process. It highlights pedagogical advantages of AI for personalized learning, methodological approaches to the implementation of digital tools, and ethical challenges related to data processing, algorithmic transparency, and pedagogical responsibility. The article emphasizes the need to develop new digital competencies among teachers and to establish regulatory frameworks for responsible AI use in education.*

Keywords: *artificial intelligence; digital pedagogy; personalized learning; algorithms; ethical standards; digital competencies; future education.*

Introduction. Modern education is undergoing a large-scale digital transformation driven by the development of artificial intelligence (AI) technologies, algorithmic data processing, multimodal neural networks, robotics, and virtual learning environments. Artificial intelligence is becoming a key factor that transforms not only the technological infrastructure of the education system but also pedagogical theory, methodology, content, forms, and modes of instructional organization. The transition to a digital economy, global competition, and rapid socio-economic changes require the preparation of learners who are capable of effectively interacting with large volumes of information, making decisions under conditions of uncertainty, and developing twenty-first-century skills. In this context, the integration of AI is not merely an innovation but an objective necessity that determines the quality of future education.

The main challenge of modern pedagogy lies not so much in mastering technologies as in understanding how AI influences cognitive processes, the structure of interaction between teachers and learners, curriculum content, and educational outcomes. This necessitates a scientific analysis of AI integration into the educational environment as a complex, multi-level process encompassing pedagogical, psychological, social, ethical, and organizational-legal aspects.

The integration of AI into education is based on pedagogical and methodological foundations that require consideration of learners' cognitive characteristics, the dynamics of competence formation, the diversity of educational needs, and the necessity of individualized learning trajectories. AI provides unique opportunities for personalized learning, as it is capable of analyzing large datasets, identifying patterns in learner behavior, predicting academic performance, detecting knowledge gaps, and adapting the content and complexity of learning materials to an individual pace of acquisition. This creates conditions for building an educational environment oriented not toward an average mass learner, but toward each individual student, taking into account their unique characteristics, interests, and educational needs.

The application of AI in education is grounded in several technological directions. First, these include Intelligent Tutoring Systems (ITS), which simulate the activities of an experienced

teacher, analyze learner responses, provide individualized tasks, deliver adaptive feedback, and create conditions for the gradual increase in learning complexity. Such systems are widely used in mathematics, programming, language learning, and natural sciences, demonstrating high effectiveness when working with learners of varying levels of preparedness.

Second, AI is actively employed in learning analytics, enabling the analysis of large-scale data on learners' educational activities, the prediction of academic failure risks, the identification of learner types, the analysis of thinking styles, and the monitoring of learning outcomes over time. This makes education more transparent, measurable, manageable, and oriented toward quality improvement. Third, a crucial direction is generative AI, represented by large language models capable of explaining complex topics, generating texts, creating learning tasks, analyzing errors, engaging in dialogue, and adapting instructional materials to the learner's age and proficiency level. Generative AI models possess the potential not only to automate certain pedagogical tasks but also to create new learning formats, including dialog-based simulations, immersive educational scenarios, virtual laboratories, and personalized AI tutors.

An important component of the modern digital educational environment is the use of VR/AR technologies enhanced with AI agents. Virtual reality enables the modeling of learning situations that are impossible or too costly to reproduce in the real world, such as chemical experiments, biological processes, complex engineering tasks, historical reconstructions, and simulations of human or system behavior. The integration of VR/AR with AI agents capable of responding to learner actions, providing prompts, correcting errors, and adapting scenarios creates a unique learning environment that enhances learner motivation and engagement. AI is also applied in robotics and educational platforms, where intelligent educational robots equipped with machine learning elements perform the role of teaching assistants and support the learning of programming, mathematics, engineering, and social skills.

The integration of artificial intelligence into education is inseparably linked to the transformation of the teacher's role. The teacher is no longer the sole source of knowledge, as AI provides instant access to information. However, the role of the educator does not diminish; rather, it becomes more significant and complex. The teacher assumes the roles of coordinator of the educational process, moderator, tutor, mentor, expert in critical information analysis, and architect of the learning environment. Educators are responsible for interpreting data, supporting learners, fostering emotional intelligence, shaping values, and ensuring the quality and correctness of AI system functioning. This transformation requires new professional qualifications, including digital literacy, an understanding of AI operating principles, the ability to integrate technologies into pedagogical design, and the capacity to develop learners' sustainable cognitive skills that protect them from digital dependency.

Scientific research demonstrates numerous advantages of AI in education. Key benefits include increased learning effectiveness, individualized learning trajectories, enhanced learner motivation, accelerated feedback, automation of routine processes such as assignment assessment and test generation, improved accuracy of knowledge diagnostics, expanded opportunities for learners with special educational needs, and the creation of inclusive learning environments that accommodate individual limitations and needs. AI is capable of supporting learners experiencing difficulties, generating additional tasks for high-achieving students, conducting continuous monitoring, and enabling ongoing reflection.

However, the integration of AI is accompanied by significant risks that must be considered to establish a sustainable digital educational ecosystem. Ethical risks include threats to learner data

privacy, potential data breaches, insufficient algorithmic transparency, the intensification of social inequalities, algorithmic bias, and the lack of control over data used for model training. Pedagogical risks involve reduced learner autonomy, substitution of critical thinking with AI-generated responses, decreased depth of understanding, technological dependency, and distortion of skills related to information search and data analysis. Organizational risks are associated with inadequate technical infrastructure, shortages of qualified personnel, insufficient regulatory frameworks, high financial costs of AI implementation, and resistance from educators unwilling or unprepared to modify their pedagogical approaches.

Effective AI integration into the educational process requires a systemic strategy consisting of several stages. The first stage is diagnostic and preparatory, involving analysis of institutional technical capabilities, identification of educational objectives, selection of AI tools, teacher training, and preparation of regulatory documentation. The second stage is pilot implementation, which includes testing AI tools in selected classes, methodological adaptation, data collection, and quality control. The third stage is effectiveness evaluation, based on analysis of learning outcomes, correlation with instructional methods, assessment of learner and teacher satisfaction, and expert evaluation.

The fourth stage is scaling, which enables AI implementation across the entire educational institution, the development of new curricula, and the integration of AI components into study programs. The formation of teachers' digital competence is of particular importance. Educators must not only be able to use AI tools but also understand their limitations, explain their operating mechanisms to learners, develop skills of critical information evaluation, and foster responsible attitudes toward digital resources. AI should not replace the teacher but rather extend pedagogical capabilities, allowing educators to focus on learners' personal development, creative and research activities, student support, and the construction of individualized learning pathways.

In the long term, AI will become an integral component of the educational environment, ensuring adaptive learning, intellectual support, comprehensive assessment of learning outcomes, integration of data from multiple sources, and the creation of digital twins of learners that enable the modeling of educational scenarios. The advancement of AI will lead to the emergence of new professions in education, such as educational data analysts, digital curriculum designers, AI tool curators, and AI ethics specialists. Furthermore, AI will serve as a foundation for blended learning models that combine traditional instructional methods with digital technologies.

The theoretical foundations of research on AI integration are based on constructivism, activity-based approaches, humanistic pedagogy, personalized learning theory, digital didactics, and the pedagogy of the digital age. Constructivism conceptualizes learners as active creators of knowledge, aligning with the capabilities of adaptive AI systems that form individualized learning trajectories. Humanistic pedagogy emphasizes the value of personality and the emotional and social domains, which remain central in conditions of digitalization. The activity-based approach considers learning activity as the core mechanism of knowledge formation, enabling the design of interactive digital environments. Additionally, cognitive load theory explains how instruction should be structured so that AI does not overload working memory but optimally distributes information. Self-determination theory underscores the importance of intrinsic motivation, requiring the development of AI systems that support learner interest and autonomy. Theoretical models of media education and digital literacy view AI as a media tool that requires critical analysis.

Modern digital pedagogy relies on a wide range of artificial intelligence technologies, which can be divided into several key categories:

1. Intelligent Tutoring Systems (ITS). These systems model the activities of a teacher, analyze learners' responses, identify knowledge gaps, and adapt the complexity of instructional material.
2. Educational analytics and big data analysis (Learning Analytics). These technologies enable the identification of risks of academic failure, prediction of learning outcomes, monitoring of learner activity, and optimization of the educational process.
3. Generative artificial intelligence. Neural language models generate texts, illustrations, learning tasks, and interactive scenarios, and may perform tutoring functions.
4. Robotics and AI assistants. Educational robots support the learning of mathematics, languages, programming, and engineering disciplines, while also fostering the development of social skills.
5. VR/AR technologies with AI agents. These technologies create immersive environments that allow for the modeling of situations impossible to reproduce in real-life conditions.
6. Adaptive learning systems. They use machine learning algorithms to adjust educational content to the unique characteristics of each learner.
7. Digital twins of learners. These models reflect the individual dynamics of learner development and enable the prediction of educational scenarios.

Together, these technologies form a new educational ecosystem in which learning becomes flexible, adaptive, interactive, and continuous. The integration of artificial intelligence into education requires the creation of specific pedagogical conditions, including:

1. digital literacy of educators;
2. methodological readiness for AI application;
3. development of adaptive curricula;
4. ensuring a psychologically safe digital environment;
5. support of learner motivation;
6. pedagogical quality control of AI system functioning;
7. development of critical thinking.

A special role is played by pedagogical reflection. Teachers interpret data generated by AI, explain the use of digital tools to learners, and foster media literacy, digital ethics, and responsible behavior. At the institutional level, the following conditions are essential:

– availability of technical infrastructure;
– staff training;
– development of regulatory frameworks;
– обеспечение cybersecurity;
– monitoring the effectiveness of AI implementation.

Risks and Ethical Challenges. Despite the significant advantages of AI, several risks remain:

– threats to data privacy;
– algorithmic bias;
– intensification of digital inequality;
– reduced learner autonomy;
– development of digital dependency;

– disruption of emotional connections among participants in the educational process.

Ethical challenges include issues of algorithmic transparency, responsibility for decision-making, data protection, and adherence to principles of inclusion. The development of digital ethics—a system of norms and rules regulating human behavior in the digital environment—is therefore essential.

Research Methods. The study employed methods of theoretical analysis, comparative examination of pedagogical practices, synthesis of international experience, content analysis of academic publications, systematization of scientific approaches, and the design of an AI integration model.

Results and Discussion. The analysis demonstrates that AI integration facilitates the transition of the education system to a new level by ensuring:

– increased efficiency;
– enhanced learner motivation;
– individualized learning trajectories;
– reduction of educational inequality;
– improved quality of diagnostics;
– development of digital culture.

However, sustainable AI implementation requires a comprehensive approach that integrates pedagogical, psychological, methodological, and regulatory components. Artificial intelligence does not replace the teacher but expands pedagogical possibilities, allowing educators to focus on learner-centered development.

Conclusion. The integration of artificial intelligence into education represents a strategic direction in the development of modern pedagogy. It requires the combination of technological innovation with humanistic values, pedagogical professionalism, and ethical responsibility. Successful AI implementation is possible only through systematic teacher training, the creation of a safe digital environment, the development of adaptive methodologies, and the cultivation of critical thinking among learners. Artificial intelligence has the potential to become a powerful tool for enhancing educational quality and opening new opportunities for all participants in the educational process.

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THE ROLE AND SIGNIFICANCE OF PROBLEM SITUATIONS IN TEACHING MATHEMATICS

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Abstract. *This article (or dissertation) analyzes the role and significance of creating problem situations in the teaching of mathematics. A problem situation is defined as a cognitive contradiction between students’ existing knowledge and new concepts or tasks, which motivates them to engage in active inquiry, formulate hypotheses, and find logical solutions. The study highlights the pedagogical and didactic aspects of problem situations, as well as their importance in developing students’ independent thinking, logical reasoning, and practical skills. Furthermore, it demonstrates that the use of problem situations enhances students’ ability to apply knowledge in practice, makes the learning process more interactive and effective, and improves the quality of education through error analysis. Using mathematical formulas, graphs, and diagrams, the mechanisms by which problem situations activate students’ cognitive activity are scientifically explained. As a result, it is emphasized that the creation of problem situations is an essential tool for developing creative and analytical thinking, reinforcing mathematical knowledge, and increasing students’ ability to apply what they have learned independently.*

Keywords: *mathematics, problem situation, learning activity, logical thinking, independent thinking, pedagogical effectiveness.*

INTRODUCTION

Creating problem-based situations in the teaching of mathematics occupies a central role in activating students’ cognitive activity and developing their independent thinking and logical reasoning skills. A problem situation is a cognitive contradiction that arises between a learner’s existing knowledge and new knowledge or a task, encouraging the learner to engage in inquiry, formulate hypotheses, and find solutions.

Unlike traditional explanatory teaching methods, this approach does not involve the passive reception of knowledge but rather promotes its active acquisition and practical application. Therefore, problem situations stimulate a high level of motivation among students, make the lesson process interactive, and contribute to the consolidation of knowledge [1].

From a didactic perspective, the effective organization of a problem situation requires several conditions. First, the situation must be connected with students’ prior knowledge, ensuring logical continuity of learning. Second, the situation should be meaningful and embedded in a real-life context, motivating students to make decisions and seek their own solutions. Third, it is important that the situation integrates individual and collaborative student activities, fostering communication and exchange of ideas. In addition, analyzing students’ errors and correcting them within problem situations enhances the integrity of learning activities and increases learning effectiveness [2].

In terms of practical significance, problem situations considerably strengthen students' independent inquiry skills. Research shows that creating problem situations in mathematics lessons increases students' cognitive engagement, involves them in solving previously unfamiliar problems, and develops their level of logical thinking.

Moreover, this approach allows teachers to individualize and differentiate instruction, as each student develops through problem situations appropriate to their level of knowledge. Furthermore, problem situations bring the learning process closer to a scientific research model: students formulate hypotheses, conduct experiments, analyze results, and draw conclusions.

This process not only reinforces mathematical knowledge but also forms analytical thinking, logical inquiry, and creative problem-solving skills. Therefore, the systematic and purposeful use of problem situations in lessons enables the development of students' complex thinking, strengthens knowledge, and provides opportunities for the independent discovery of new knowledge.

In the modern education system, great emphasis is placed on developing students' independent thinking, analytical approaches, and creative reasoning in the process of teaching mathematics. Mathematics is not only a subject focused on calculations or learning formulas but also a scientific discipline that shapes intellectual culture and develops logical thinking. For this reason, the use of problem-based learning methodologies in the educational process is considered one of the key requirements of contemporary pedagogy (Qodirova F.U., Matupayeva Sh.Z., 2022).

A problem situation (problem-based learning) is a state of cognitive contradiction that arises between a learner's previously acquired knowledge and a new concept or task. This process encourages students not merely to memorize ready-made answers but to independently search for solutions, propose hypotheses, and test them. As a result, students develop logical thinking, creative approaches, and problem-analysis skills [3].

1. Pedagogical Essence of Problem Situations. The main purpose of creating problem situations in mathematics education is to form students' "interest in cognition," that is, cognitive activity. The teacher organizes the learning process in such a way that students feel the need to seek new knowledge in order to solve the problem they face. This process can be represented in the following sequence:

$K_0 \rightarrow Problem \rightarrow H \rightarrow E \rightarrow K_n$

Here:

- $\mathbf{K_0}$ — a set of existing knowledge,
- **H** — hypothesis (assumption),
- **E** — experiment or verification process,
- $\mathbf{K_n}$ — a system of new knowledge.

In problem situations, the teacher does not provide direct answers to students but instead guides them toward finding solutions independently. This approach is applied in harmony with Socratic dialogue, inquiry-based learning, and inductive–deductive teaching methods.

2. Didactic Characteristics of a Problem Situation

From a didactic point of view, a problem situation has the following characteristics:

1. **Creating a contradiction between pieces of knowledge.** A problem situation arises when a learner's previously acquired knowledge is insufficient to solve a new task.
2. **Creating cognitive conflict.** In this process, the learner becomes aware of gaps in their knowledge, which leads to the emergence of an internal motivation to learn.

3. **Encouraging independent inquiry.** The learner formulates a hypothesis, tests it, and evaluates the result.

4. **Conscious acquisition of knowledge.** The acquired outcome is not merely memorized but discovered through personal experience.

3. Methods of Creating Problem Situations.

There are several effective methods for creating problem situations in mathematics lessons:

1. **Presenting a problem with incomplete conditions.** The learner realizes that the given information is insufficient and begins independent exploration [4]. *Example:* "If the equation of a straight line is given in the form y=kx+by = kx + by=kx+b, what is the geometric meaning of kkk and bbb?"

2. **Tasks with multiple solutions.** This method develops students' flexible thinking. *Example:* Explaining that the equation $x^2=9$ has two solutions.

3. **Creating logical contradictions.** Questions such as "Why is the square of a negative number positive?" encourage analytical thinking.

4. **Situations based on graphical analysis.** For example, analyzing the number of roots of the function $f(x)=x^2-2x-3$ based on its graph. These methods teach students not only to solve problems but also to construct problems themselves.

4. The Impact of Problem Situations on Students

Empirical studies show that in lessons where problem situations are applied:

- students' interest in lessons increases by **30–40%;**
- the level of academic achievement is **1.3–1.5 times higher**;
- the speed of solving problems that require logical reasoning increases by **25%**;
- the number of students demonstrating creative thinking increases by **15–20%**.

As a result of problem-based learning, students do not act as passive recipients of knowledge but participate as active subjects in the learning process. Consequently, they acquire skills in justifying their opinions, testing hypotheses, and drawing reasoned conclusions.

5. The Role of the Teacher in Creating a Problem Situation

In this process, the teacher acts as an organizer, facilitator, and observer. Through problem-based questions, logical inquiry, and discussion, the teacher encourages students to engage in active thinking.

For example, when teaching a linear equation, the following dialogue may be organized:

- Why can the equation ax+b=0 be solved only once?
- How does the equation change if a=0?

Such questions compel students to search for answers, thereby activating their cognitive processes [5].

6. Lesson Model Based on Problem Situations

The following stages represent the general algorithm of a problem-based learning lesson:

1. **Problem presentation:** The teacher introduces a new problem.

2. **Analysis and hypothesis:** The student analyzes the problem and formulates a hypothesis.

3. **Searching for a solution:** The solution is found through mathematical formulas, graphs, and logical reasoning.

4. **Verification of results:** The obtained solution is tested practically or theoretically.

5. **Conclusion and generalization:** The student constructs new knowledge based on personal experience.

The effectiveness of this model depends on the teacher's methodological preparedness and the student's level of cognitive motivation.

Conclusion. Throughout the study, the theoretical foundations, didactic potential, and practical effectiveness of using problem situations in mathematics education were thoroughly analyzed. The findings indicate that problem-based learning methodology plays a significant role in activating students' cognitive activity, developing their thinking abilities, and individualizing the educational process.

A problem situation creates a state of cognitive conflict and knowledge insufficiency in students' thinking, motivating them to search for solutions. In this process, students analyze their existing knowledge, propose new hypotheses, and consciously acquire new knowledge. In this respect, problem-based learning transforms not only the form of educational activity but also its internal content.

The study reveals that in lessons based on problem situations:

- students' activity levels increase by **30–40%,**
- logical reasoning skills improve by **25–30%,**
- creative thinking levels rise by approximately **20%.**

These results demonstrate that problem-based learning is more effective than traditional instructional approaches.

Pedagogical analysis shows that the effectiveness of creating problem situations in mathematics lessons largely depends on the teacher's methodological competence, psychological insight, and ability to consider students' individual characteristics. By correctly formulating problems and analyzing them step by step, the teacher fosters a spirit of scientific inquiry among students.

The specificity of mathematics as a discipline lies in its reliance on theoretical concepts and logical relationships. Therefore, problem situations represent one of the most natural and effective instructional tools for this subject. For instance, problem-solving tasks, graphical analysis, and function modeling in algebra, geometry, and calculus deepen students' analytical thinking. The research findings indicate that the systematic application of problem-based learning provides the following scientific and pedagogical advantages:

1. It develops students' logical and analytical thinking skills.
2. It enables the conscious acquisition and practical application of knowledge.
3. It elevates the learner to the level of an active subject.
4. It ensures research-based collaboration between teacher and student.
5. It activates self-assessment and reflection processes.

Moreover, the use of problem situations plays an important role in shaping students' mathematical thinking culture. It teaches learners to analyze cause-and-effect relationships, justify solutions, and draw conclusions rather than merely search for ready-made answers. In conclusion, problem-based learning is not merely a teaching method but a philosophy of education grounded in scientific inquiry.

Closely aligned with the competency-based approach of modern pedagogy, it represents one of the most effective directions for developing creativity, independence, and critical thinking in mathematics education. Therefore, for mathematics teachers, designing problem situations,

adapting them to lesson content, and applying them on a didactic basis should be regarded as a priority area of scientific and methodological activity.

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EQUATIONS AND EXPRESSIONS IN PRIMARY EDUCATION, METHODS FOR DEVELOPING LOGICAL THINKING

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Abstract. *This methodologically recommended practical exercise template is dedicated to effectively covering the topic of formulating and solving equations in elementary school mathematics based on the 3E and 5E models, developing students' critical and creative thinking through logical tasks, and explaining logical tasks in mathematics lessons through working in small groups. During the lesson, students are trained in a simple and understandable way to determine an unknown number, construct expressions, and work with equations. In the "Engage" stage, students' attention is drawn to real-life examples, and in the "Explore" stage, they are enabled to construct equations and find solutions on their own. In the "Explain" stage, the student understands the topic more deeply by explaining his/her opinion. Using the 3E and 5E models, the lesson is organized in an interactive, communicative, and creative spirit. Through this method, students develop the skills of independent thinking, analysis, and coherent explanation. The recommendation provides guidance to teachers in teaching the topic of equations in an effective and modern way.*

Keywords: *equation, 3E model, critical thinking, research, interpretation, early childhood education, small groups, creative thinking, development, logical tasks, mathematical thinking.*

Introduction

Mathematics is one of the key subjects in developing the mental potential of students in primary grades. Through this subject, students acquire not only arithmetic operations, but also skills such as logical thinking, problem analysis, and consistent conclusions. This lesson plan activates students' thinking skills through practical exercises such as working on expressions, constructing and solving equations, and finding unknown numbers. Each stage is approached step by step, and reinforcement and homework also serve to ensure thorough mastery. In the lesson, students are taught to formulate an equation and solve it using the selection method. Also, interest in the lesson is increased by connecting mathematical expressions with real-life problems. This lesson also serves to develop skills in the student such as clearly expressing his/her thoughts, conducting logical analysis based on equality, and understanding the relationship between numbers.

Importance of the topic:

Working with equations and expressions is one of the basic arithmetic skills for elementary school students. It is especially important to master this subject from an early age, as it is closely related to real-life issues. Equations are an important mathematical tool that allows students to think critically, find logical solutions, and identify cause-and-effect relationships. Through any equation, students learn to find the unknown value. This is useful in solving problems in everyday life. The topic is in line with modern teaching standards and teaches students analytical thinking, consistency, and accuracy. The examples, equations, and conditional problems given in this topic

are taken from real life and serve as an important tool in shaping students' thinking. Logical thinking is a systematic, clear, and orderly process of thinking, which refers to a person's ability to draw correct conclusions, solve problems, and make decisions based on information. Logical thinking usually involves the use of clear rules and patterns, and through this process, thoughts are protected from erroneous or misleading conclusions.

Lesson goals and objectives:

Educational goal: To explain to students the concepts of equations, expressions, addition, subtraction through practical examples; to teach them to construct equations and solve them using the selection method.

Educational goal: To teach students to work independently, to justify their opinions with evidence, and to approach them responsibly.

Developmental goal: To develop students' thinking, critical thinking, mathematical analysis, and independent problem-solving skills.

Tasks:

To teach students to work with equations and expressions;

To develop reasoning skills in determining an unknown number;

To explain the practical importance of mathematics through the analysis of practical problems;

To organize group work activities to develop students' logical thinking.

Research materials and methodology

The main components of logical thinking are:

Concepts and definitions: In logical thinking, each concept must be clearly defined. For example, concepts such as "justice" or "equality" can be expressed in different ways, but they must be correctly and clearly defined in logical thinking.

Cause and Effect: Logical reasoning involves identifying the connection between causes and effects. In this process, if you understand that cause A leads to effect B, identifying the relationship between A and B is a key part of logical reasoning.

Arguments: Logical thinking requires drawing conclusions based on arguments. Arguments are based on evidence, facts, or observations. If the arguments are convincing and logically sound, the conclusion is also correct.

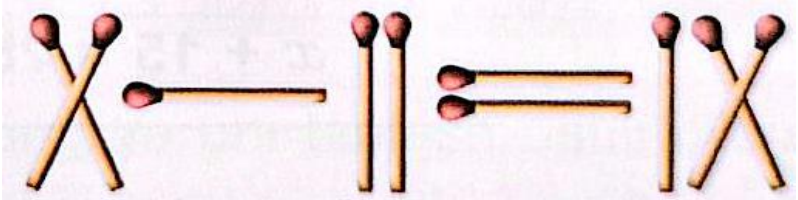
Analysis and synthesis: In the process of analysis, existing information is analyzed and the connections between them are studied. In the process of synthesis, the information obtained is combined and new conclusions or ideas are drawn.

Drawing a conclusion: The final step in logical reasoning is drawing a correct conclusion. If all the arguments are correct, then the conclusion is logically correct.

Identifying logical fallacies: Identifying logical fallacies is also important in logical reasoning. Logical fallacies (or “logical fallacies”) lead to incorrect conclusions. These include errors such as incorrect generalizations, incorrect inferences, or reliance on unfounded evidence.

Search results

Example 6. Take one matchstick so that the resulting equation is true.



The marked matchstick is removed: 10 – 1 = 9.

Review of the previous topic. Students' homework is checked, notebooks are exchanged. Students are encouraged with grades placed on notebooks.

81 – 10 = 71 66 – 34 = 32 97 – 16 = 81

54 + 32 = 86 71 + 14 = 85 18 + 31 = 49

Example 8. The book on the history of Bukhara has 84 pages, and the book on the history of Samarkand has 12 pages more. How many pages does the book on the history of Samarkand have? 84 + 12 = 96 pages.

Students are introduced to a new topic.

Example 1. Replace the components shown in the equations with Latin letters. Write down what is obtained.

14 + 12 = 26 1st addendum

25 + 11 = 36 II st addendum

18 – 8 = 10 parting

45 – 21 = 24 decreasing

Write equations for the following conditions:

a) 18 is added to x. The result is 28; x + 18 = 28 x = 28 – 18 x = 10.

b) 42 is subtracted from x. The result is 53; x – 42 = 53 x = 53 + 42 x = 95.

3E Model Coverage:

1. Engage

We engage students' attention through a simple real-life situation:

"Farhad's father gave him 18 candies. How many more candies does Farhad bring to make 28?" " Through this question, students begin to transform a simple event in life into a mathematical problem. Students discuss how to determine the number of candies. At this stage, interest is aroused, and attention is directed towards the mathematical problem.

2. Explore

Students try to solve the equation themselves:

"x + 18 = 28" — they understand that to find the unknown number, they need to do the inverse operation.

Then they conclude:

x = 28 – 18

x = 10.

Working in groups or pairs, they help each other, evaluate and check the solution. They also try to solve similar equations based on other conditional examples**.**

3. Explain (Explanation and generalization)

Students explain their work orally and in writing:

"x is an unknown number. If we add 18 to it, we get 28. Therefore, x = 28 – 18, which is 10"

At this stage, the student deepens the basics of mathematical thinking. The teacher summarizes: "An equation is a mathematical equality constructed to find an unknown number. If we are given a sum and one of them, we find the other by subtracting it."

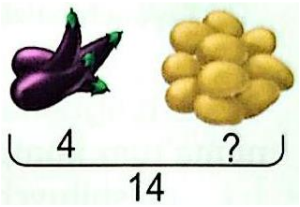
Result:

Students develop the ability to construct equations and find an unknown number through inverse operations.

Through the 3E model, the lesson becomes interactive, understandable, and rich in active participation.

d) The number x was subtracted from the number 90. The number 20 was formed. 90 – x = 20 x = 90 – 20 x = 70.

Example 3. Write an equation based on the picture. Label the unknown number with a letter.



4 + x = 14 x = 14 – 4 x = 10.

Reinforcement of a new topic.

Example 4. Make equations and solve them by the selection method.

a) 28 liters of yogurt were brought to the school cafeteria. If 16 liters of yogurt were left for lunch, how much yogurt did the children drink for breakfast? 28 – x = 16 x = 28 – 16 x = 12.

b) 18 liters of juice were prepared in the cafeteria. If apple juice makes 12 liters, how many liters of pear juice were prepared? 18 – x = 12 x = 18 – 12 x = 6l.



Example 5. Write the numbers that are left out in the blanks.

41 + 14 = 55 84 – 32 = 52 13 cm + 41 cm = 54 cm 42 dm – 30 dm = 12 dm

Benefits of Logical Thinking:

• **Problem Solving:** Logical thinking makes it easier to solve complex problems because each step can be evaluated in a clear and systematic way.

• **Decision Making:** Logical thinking helps you make sound and accurate decisions because it considers every possibility and outcome.

• **Error Avoidance:** Logical thinking makes it easier to identify and avoid errors, which improves your decisions in life.

• **Creativity and Innovation:** Logical thinking not only supports drawing clear conclusions, but also generates new ideas.

Creative thinking is the process of generating new ideas, breaking away from conventional thinking, and finding new, innovative solutions to problems. The following methods can be used to develop creative thinking through logical tasks:

Problem Solving: Present students with open-ended problems and encourage them to solve them with their own ideas and approaches. For example, they may need to find creative solutions to solve a social problem in a community or to create a new technology.

Brainstorming: Ask students to generate a set of ideas on a specific topic. They should write down all the ideas and then select the best and most innovative solutions. This method encourages students to think creatively and allows them to generate new ideas.

Combining topics: Ask students to combine different topics to generate new and original ideas. For example, combining science and art to find new solutions to a social problem. This expands students' creative approaches.

Metaphors and Analogies:

Discussions. ***5E Model Lighting***

1. Engage A lesson can be started with a question like this:

"Have you ever tried filling in the blanks between numbers? For example, 41 + 14 = what is it?" We will engage students' attention through simple and familiar examples and arouse

their interest in filling in the blanks. ❓*"Why do you think there is no number in the blank? How can we find it?"*

2. Explore

Students begin to work on expressions in groups or pairs:

➖ They work together on examples:

• 41 + 14 = 55

• 84 – 32 = 52

• 13 cm + 41 cm = 54 cm

• 42 dm – 30 dm = 12 dm

They do the addition and subtraction themselves and write the answer in the blank. They also think about units (cm, dm).

3. Explain

Students explain the examples they worked on orally and in writing:

📝 "In the first example, I added 14 to 41, which is 55. This is an addition operation."

📝 "If we add 13 cm and 41 cm, we get 54 cm. The units of measurement are preserved."

The teacher focuses on each operation in this process and summarizes the units, numbers, and mathematical logic in the expression.

4. Elaborate

Students create new examples similar to the form in the task:

✍ For example:

• 36 + 29 = ?

• 70 – 25 = ?

• 18 cm + 22 cm = ?

• 50 dm – 20 dm = ?

• At this stage, they are also offered more complex examples, including tasks to work with 2-digit numbers and to handle units carefully.

● 5. Evaluate

Students' performance can be evaluated as follows:

✅ A star or incentive is given for each correctly completed action.

✅ Individual knowledge is tested based on the questions:

– "Why does 84 minus 32 equal 52?"

– "If 13 cm is added to 41 cm, what unit of measurement is formed?"

Students' independent thinking, ability to give their own explanation, and the method of achieving the result are evaluated.



✅ Final conclusion:

Based on the 5E model, students will be able to:

Develops the skills of mastering mathematical operations,

• paying attention to units of measurement,

• thinking independently and justifying one's own explanation,

• constructing and complicating similar examples.

Concluding the lesson. Motivating students based on their performance in the lesson

Benefits of Logical Tasks

Systematic organization of ideas: Students learn a clear and orderly approach to solving problems.

Stimulating creativity: Logical tasks encourage students to generate new and original ideas.

Improving problem-solving skills: Students learn to solve problems through different approaches.

Reasoning confidently: Students learn to base their opinions on evidence. Thus, logical tasks teach students not only to memorize information, but also to think critically and creatively. This greatly contributes to their overall intellectual development.

Explaining logical tasks in mathematics lessons through work in small groups is a very effective way to increase students' intellectual potential and develop collective thinking. By working in groups, students learn from each other, share their ideas, and develop mathematical thinking skills by solving problems together. Small groups help students not only consolidate their knowledge of mathematics, but also develop critical and creative thinking.

Benefits of working on logic problems in small groups:

Develops teamwork: By working in small groups, students explain their ideas to each other and solve problems together. This broadens the approach of each student in the group to mathematical problems and helps to introduce new ideas.

Increases critical thinking: Working in a group allows students to listen to other ideas and evaluate their own approaches. This process develops critical thinking skills in students, as they learn the basis of each problem or solution.

Encourages creative thinking: When solving logic problems in a group, students complement each other's ideas and develop new, creative solutions. Each student contributes their own creative ideas, which encourages the group to find new and original solutions.

Cooperative Learning: By working in small groups, students help each other, discuss questions together, and exchange ideas. This makes the learning process effective and helps students learn from each other.

Improving Problem-Solving Skills: Working in small groups allows students to learn different ways to solve problems together. This strengthens students' logical thinking and problem-solving skills.

Methods for developing logical thinking.

The game "Find the sum of the missing numbers"

The game Find the hidden number is a mental game in which participants try to find a hidden or hidden number.

Objectives:

• Developing logical thinking: Participants try to find the hidden number in a logical way.

• Strengthening attention: The game increases the ability to concentrate and remember.

Developing problem-solving skills: Different logical steps are required to find the hidden number.

Creative thinking: Participants develop creative thinking by trying different methods.

How to play:

1.Preparation of participants:

1.The game can be played individually or in a group.

2.The game requires a game leader (or moderator), who determines the hidden number and gives instructions to others.

2.Finding the hidden number

1.The game leader hides a number. The participants must find this number.

2.There are different ways to hide the number:

3.The game leader writes down the number (or hides it in certain symbols).

4.The hidden number is kept secret and the participants are allowed to find it through changes or instructions.

3.It is found through arithmetic operations.

4. Determining the result of the game:

1.The participant or group that correctly guesses the hidden number wins.

2. If no one answers correctly, the hidden number will be revealed at the end of the game.

"Mathematical Dictation" Game

Mathematical Dictation Game is a game-like activity that is conducted in the process of learning mathematics to strengthen students' mathematical skills and teach them to calculate quickly and accurately. This game helps students to concentrate, identify errors, and improve mathematical concepts.

Purpose:

• Strengthen students' mathematical knowledge.

• Increase calculation speed.

• Develop attention and logical thinking.

• Improve students' skills in expressing mathematical concepts clearly and quickly.

Procedure:

Preparatory stage: Before conducting a mathematical dictation, the teacher explains to the students what questions will be asked and reminds them of the necessary formulas or mathematical rules.

Reading the questions: The teacher reads the mathematical questions to the students one by one. The questions can be different, for example, addition, subtraction, multiplication, division, solving equations, etc.

Writing the answers: Students must listen to the questions and quickly write down the answers. In this process, they perform calculations accurately and quickly.

Checking the results: After the teacher completes the dictation, the students check their answers. The teacher helps to identify errors by discussing correct and incorrect answers.

Increasing the level of difficulty: During the game, the questions may become more difficult, so students learn to solve more complex problems.

"What would it be like?" game

Objective: The "What if?" game is a game that helps develop thinking and increase creativity, and it can be played in a group or individually.

Objective:

Developing creative thinking: Game participants develop creative and new ideas by imagining a specific situation or situation.

Developing social and communication skills: A game played in a group helps to improve social relationships, express one's own opinion, and listen to the opinions of others.

Improving logical thinking: Analyzing a given question or situation and considering its consequences logically.

Procedure:

1. Preparing participants:

The game can be played in a group or individually. It is necessary to create a comfortable environment for each participant to express their thoughts openly and freely.

2. Starting the game:

o One of the participants or the game leader states the condition or question of the game. For example:

o "What would it be like if the world were completely blue?"

o "How would life change if people could fly like birds?"

o “What would it look like if the ground was only black?”

o The game conditions or questions should be very creative and exciting, giving participants a wide range of options.

3. Ideas and answers:

Participants answer individually or in groups. Each participant explains their idea as detailed and logically as possible. Answers should be creative and unique, because the goal of the game is to expand ideas.

4. Sharing with others:

Other participants can hear each answer and express their own ideas. This helps to evaluate or further develop the ideas. Answers are compared and participants can be inspired by each other's ideas.

5. End of the game:

At the end of the game, all participants analyze their thoughts and imagination. The most creative, interesting or most logical answers can be chosen. The results of the game show that the group has developed creativity and logical thinking skills.

Conclusion and recommendations

During the lesson, students developed skills in working with equations and expressions, connecting them with practical problems. Through various examples, they acquired practical skills such as finding an unknown number, constructing expressions, and solving equations by the method of choice. Students' mathematical thinking, accuracy, consistency, and logical thinking skills were strengthened. Each stage of the lesson — review of the previous topic, explanation of the new topic, consolidation, and homework — was organized in a consistent manner. On this basis, we recommend the following to teachers:

Use real-life examples when working on equations and expressions.

• Create opportunities for students to work in groups, express opinions, and provide explanations.

• Ask critical questions for each new example: “Why is this solution correct?”, “How else can it be solved?”

• Reinforce students’ knowledge through practical tasks from time to time.

• Set homework assignments that encourage independent thinking.

Through such approaches, elementary school students will be able to increase their interest in mathematics and master basic skills.

How to teach logical tasks through group work?

Clearly present the task: Before giving the task to the group, it is necessary to give students a clear explanation of the purpose of the problem and how to solve it. For example, giving a brief description of the problem and showing how to approach it will guide the students in their work.

Organize the group correctly: Groups should be small, consisting of 3-4 people. In this group, each student will have the opportunity to actively participate and express his/her opinion. Also, students of different levels can be combined to strengthen cooperation between groups.

Problem Analysis: Before each group solves a math problem, it is important to teach them how to analyze the problem. For example, by identifying the problem, using formulas or diagrams, and going through each step of the problem in order.

Setting Goals and Choosing an Approach: Groups should choose what method to use to solve the problem. They can solve the problem graphically, algebraically, or in other ways. This allows students to develop their own approaches and evaluate the ideas of other groups.

Debriefing: After solving the problem, groups present their results. Students should compare and learn from their conclusions with those of other groups. Through this process, they will evaluate the logic and effectiveness of each solution.

Structured Discussion: After each group has presented its results, encourage all students to discuss them together. During this discussion, students share what difficulties they encountered in solving the problems, what solutions they found, and their thoughts on the solutions of other groups.

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THEORETICAL AND METHODOLOGICAL FOUNDATIONS FOR IMPROVING THE CREATIVE ACTIVITY OF FUTURE PRIMARY SCHOOL TEACHERS BASED ON A VARIATIVE APPROACH

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Abstract. *In primary education, the development of students' creative activity and thinking potential is of great importance. The article provides information and analyzes the advantages of improving the creative activity of future primary school teachers using various methods and a variant approach. Through education based on a variant approach, children develop independence, creative thinking, and the ability to solve problems in different ways, and life skills are formed in them.*

Keywords: *primary education, creative activity, variable approach, integrated lesson, problem assignment, perception, method, method, tools, variable.*

Introduction.

It is important to note that in modern pedagogical education, the modernization of the education system and its orientation toward the learner's personality has become a pressing issue. In this process, variative instruction is emerging as one of the key factors in improving the quality of education. Variative instruction implies organizing the educational process with due consideration of learners' individual capabilities, abilities, interests, and needs. In contemporary pedagogical education, providing instruction while taking into account each learner's individual characteristics is of great importance. Variative instruction, by employing diverse methods and technologies, creates opportunities to enhance learners' activity and develop their creative abilities.

Based on the statement expressed by the President of the Republic of Uzbekistan, Sh. Mirziyoyev, in his Address to the Oliy Majlis and the people of Uzbekistan "Improving the quality of education is the only correct path to the development of New Uzbekistan" the introduction of modern teaching methods into the educational process and raising learners' knowledge to the level of advanced countries worldwide is one of the most urgent tasks facing every educator. Therefore, today it is necessary to improve instruction in primary grades on the basis of a variative approach by increasing learners' interest in subjects, applying an individual approach to them, and implementing modern methods of enhancing knowledge in practice.

In pedagogical literature, the term *"variative"* means "changeable," "choice-based," or "multivariant." From this perspective, variative instruction is an educational system that ensures learners' individual development through organizing the content, forms, methods, and tools of education in various alternatives. The concept of teaching based on a variative approach in pedagogy refers to effectively using diverse methods, techniques, and resources in the teaching process while taking into account learners' individual characteristics. That is, it involves conducting lessons in accordance with each learner's abilities, interests, and learning styles.

The idea of adapting the educational process to learners' individual characteristics, abilities, and needs has been formed gradually throughout the development of pedagogical science. The scientific and methodological views of renowned world educators and psychologists can serve as a foundation for improving the creative activity of future primary school teachers based on a variative (differentiated) approach.

Educators have also expressed positive views regarding the specific features of teaching based on a variative (differentiated) approach. In particular, as a result of such instruction, learners successfully master curriculum content; growth is observed in their knowledge, skills, and creative work; their interest in subjects increases; learner activity rises; and, since instruction is provided according to learners' abilities and capacities, cases of excessive learning overload are avoided. Moreover, the needs of gifted learners for acquiring deeper knowledge are satisfied. Variative instruction of educational content, based on learners' interests, talents, aspirations, and needs, creates favorable conditions for the learner's personality to express and realize itself.

The scientific and methodological views developed by Uzbek pedagogical scholars have strengthened the theoretical and practical foundations of learner-centered and variative instruction. Today, it is necessary to further develop and improve scientific research on enhancing the creative activity of future primary school teachers based on a variative approach in accordance with modern requirements. Improving the system of teaching based on a variative approach plays an important role in the development of primary school students' cognitive activity, creative thinking, and independence.

While traditional education offers the same content to all students in a class, instruction based on a variative approach takes into account each student's level of knowledge, pace of learning, and psychological characteristics. Especially in primary grades, where students' developmental levels differ, a variative approach significantly increases the effectiveness of education. At the primary education stage, variative instruction is of particular importance, since it is at this stage that students' attitudes toward learning, cognitive activity, and independence are formed. If a student's abilities are not taken into account in the educational process, they may lose interest in learning. Teaching based on a variative approach, however, serves to ensure that every child experiences a sense of success.

From a pedagogical perspective, teaching based on a variative approach is closely linked to the concept of learner-centered education. Through such an approach, the learner is viewed not as a passive object of the educational process, but as an active subject. As a result, learners develop independent thinking, decision-making skills, and the ability to demonstrate their own potential. The purpose of providing education in primary grades based on a variative approach is to develop students' intellectual and creative potential from an early age, taking into account their age characteristics, and to ensure their active participation in lessons by relying on their interests during the learning process. This involves developing each learner's individual abilities that is, enhancing independent thinking and creative activity through the use of diverse styles and methods in lessons, making the learning process engaging and effective by applying non-standard methods to increase classroom activity, supporting various approaches, deepening knowledge, and, most importantly, creating opportunities for each learner to acquire knowledge in their own way.

For effectively organizing the instruction based on a variative approach, primary school teachers are advised to consider students' diverse abilities and learning styles, ensure an individual approach, and at the same time provide students with opportunities to make choices through various methods and tools thus developing their creative and decision-making activity. In addition,

teachers should master approaches aimed at delivering effective instruction, teaching students to think independently, and forming professional and creative skills. In education based on a variative approach, its essence is understood through providing students with choices, differentiating tasks, varying teaching methods and forms, and supporting each learner's individual trajectory of personal development.

In particular, the theory of the "Zone of Proximal Development" proposed by Russian psychologist L. S. Vygotsky serves as the psychological foundation of variative instruction. According to him, alongside a child's actual abilities, there exists a level of development that can be achieved with the assistance of adults or peers. This necessitates a differentiated, that is, variative approach in the educational process.

American psychologist Benjamin Bloom classified educational objectives into cognitive, affective, and psychomotor domains and arranged them by levels. His taxonomy supports the step-by-step development of students' cognitive activity and serves as a theoretical basis for designing variative tasks. Howard Gardner's theory of "Multiple Intelligences" also provides a scientific foundation for variative instruction. According to this theory, students develop different types of intelligence linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, and others—to varying degrees. Therefore, the use of a single method in education is ineffective; instead, diverse forms and methods must be applied. In Jerome Bruner's theory of discovery learning, students acquire knowledge not in a ready-made form, but through exploration and research.

In this context, the teacher adapts the content and methods of instruction based on the student's abilities. The American philosopher and educator John Dewey, who promoted the ideas of pragmatic pedagogy and active learning, substantiated the concept of linking education with life and viewing the learner as an active subject. According to his views, a student should have the opportunity to make independent decisions, gain experience, and make choices during the learning process. This is one of the key features of variative instruction. Italian educator Maria Montessori developed an education system based on the child's freedom, individual developmental pace, and independent activity. In the Montessori method, the learning environment and didactic materials are variative in nature, allowing each child to choose activities according to their interests.

Among the scholars who systematically developed the theory of variative (differentiated) instruction in modern pedagogy is Carol Ann Tomlinson. She scientifically demonstrated that differentiating the content, process, outcomes, and learning environment allows teachers to meet students' individual needs. In Uzbekistan, several pedagogical scholars have also conducted research on implementing learner-centered and variative teaching technologies in primary education. In their scientific and methodological views, they have paid particular attention to using differentiated assignments, innovative methods, and interactive technologies while considering students' age and psychological characteristics. For example:

R. J. Ishmukhamedov scientifically justified placing the learner at the center of the educational process and using active and independent teaching methods, thereby creating a theoretical foundation for introducing individual and variative approaches in primary education. N. N. Azizkhodjayev developed modern learner-centered and interactive teaching methods, improving the methodological foundations of variative instruction.

J. G. Yoldoshev promoted the individualization and differentiation of education while demonstrating that a variative approach enhances students' cognitive activity. B. X. Rakhimov studied the use of variative methods to enhance primary school teachers' creative activity and increase the effectiveness of primary education. Sh. A. Abdullayeva scientifically substantiated

the development of cognitive and creative abilities through variative approaches based on models of learner-centered education. In integrated education, the main features of variative instruction are defined as follows:

"Various methods" – lecture, group work, interactive games, project-based learning;

"Various tools" – books, videos, computer programs, interactive boards;

"Individualization" – providing tasks at varying levels for each student;

"Creative approach" – allowing non-standard thinking.

Instruction based on a variative approach includes:

Individualized learning, which enables each student to study according to their level and abilities;

Active learning, which ensures full participation in lessons, encourages questions, and allows students to conduct experiments;

Development of creative thinking, which enhances students' ability to generate new ideas and solutions;

Non-standardized learning, which uses non-traditional methods that make lessons engaging and motivating;

Motivation enhancement, where students work according to their preferred methods, increasing interest in learning;

Use of diverse educational tools and technologies, such as interactive slides, flashcards, group projects, and video materials, which significantly develop students' skills and abilities.

This approach ensures that learning is engaging, personalized, and promotes both cognitive and creative development in students. When teaching based on a variative approach, students' individual and cognitive abilities are developed using the most commonly applied modern methods. For example:

Collaborative Learning (Group Work) – students work in small groups and solve tasks by helping each other. The advantages of this method include developing communication, teamwork, and creative thinking skills. Mini-projects are often prepared as part of this approach.

Interactive Games – during lessons, knowledge is tested and developed through interactive games. This makes learning engaging, motivates participants, allows learning through multiple senses, and can include quizzes or question-and-answer formats.

Project-Based Learning (PBL) – students acquire knowledge by solving problems or creating projects on specific topics. This method develops independent thinking, creative problem-solving, and practical skills. For example, students may prepare presentations on nature using drawings, videos, and slides.

Case Study this method involves discussing real or hypothetical situations, which helps develop students' analytical thinking and problem-solving skills. For example, cases could include a young child's fear or resolving conflicts at school.

Interactive Technologies and Slides – lessons are conducted using computers, tablets, interactive boards, or online platforms. This provides each student with personalized learning opportunities and makes use of visual and audiovisual tools.

Role Play – students perform assigned roles in a specific situation. This method develops empathy, creative thinking, and social skills.

Differentiated Instruction – students are given tasks at varying levels of difficulty, ensuring that each student learns according to their level, which increases motivation and engagement. Many other methods can be applied, all of which contribute to the development of

learner-centered and variative education, enhance students' activity, and strengthen their knowledge.

Conclusion

In primary education, a creative activity and the organization of lessons of a teacher based on a variative approach play a crucial role in children's personal development and learning. Through learner-centered education and variative methods, teachers not only provide knowledge but also develop children's thinking skills, independence in decision-making, and social potential. The relevance of improving the creative activity of future primary school teachers through a variative approach is evident in modern school requirements. Since children have different abilities, interests, and developmental rates, traditional teaching methods are often insufficient. Therefore, the use of a variative approach and innovative technologies is considered essential.

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PLANNING THE TRAINING LOAD OF BELT WRESTLERS IN THE PRE-COMPETITION STAGE

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Abstract. *This article examines the modernization of the system for training belt wrestlers for competitions, conducting extensive surface work, developing physical qualities during the pre-competition stage, improving technical and tactical movements, and practicing new tools and methods. It also examines the definition and refinement of load application, volume, and intensity.*
Keywords: *equipment, load, size, intensity, technique, tactics, methods, physical qualities, belt wrestling.*

Introduction

It is widely acknowledged that our national wrestling styles are rapidly developing worldwide, and several of these are aimed at modernizing the system for training belt wrestlers, as well as conducting extensive work. At the same time, preparing belt wrestlers for competitions, determining the optimal load ratio, and using effective tools and methods in the training process are of great importance. The purpose of the study is to optimize technical and tactical actions when planning training loads for belt wrestlers during the pre-competition stage.

The purpose of the research is to optimize technical and tactical actions when planning training loads for belt wrestlers during the pre-competition stage.

Research objectives:

to model situations associated with the pre-competition preparation stage in high-volume and intensive microcycles of the mesocycle in belt wrestling;

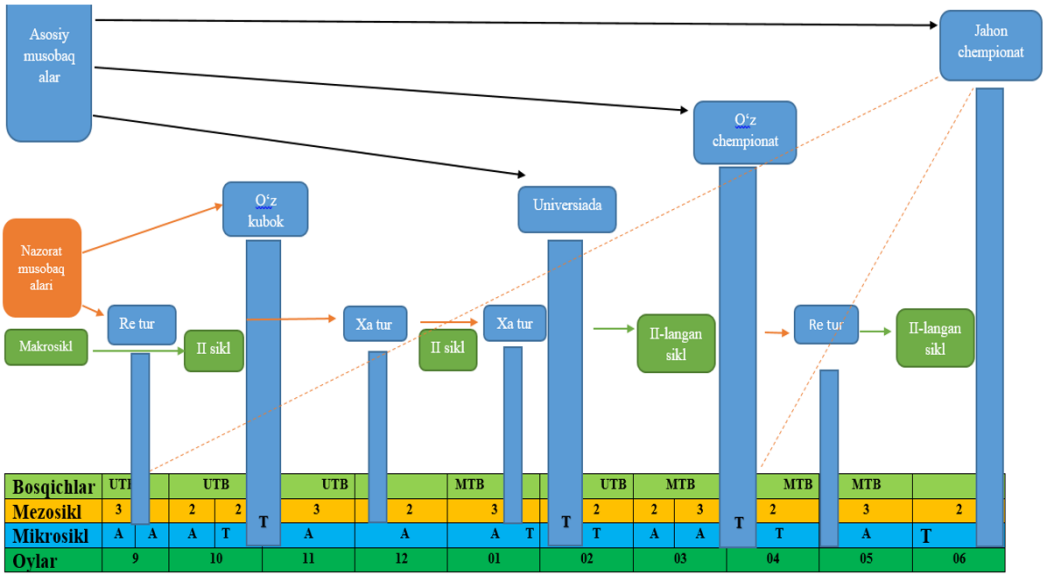
to improve elements of tactical actions during competitions by teaching belt wrestlers deceptive techniques during pre-competition preparation;

to teach belt wrestlers to overcome difficult situations in competitive matches by combining a sequence of counter-offensive techniques, ending with a "king" technique based on the introduction of techniques from a disadvantageous side;

to develop competition preparation tactics using specialized exercises selectively targeted to each situation during the execution of technical and tactical movements to improve the offensive movements of belt wrestlers during pre-competition preparation.

It is well established in the literature that the general preparation phase consisted of three microcycles, which significantly increased capabilities, developed physical qualities, and improved physical fitness. Based on the microcycle program for belt wrestlers, focused on the pre-competition and general preparation phases, it can be concluded that the results obtained in three consecutive phases were reliable.

For example, based on the total number of training sessions, the duration of daily training sessions was 90 minutes, with a total volume of 270 minutes. The average duration of training sessions during competitions was 990 minutes in each phase, for a total of 2,880 minutes. Similarly, the proportion of single-day training (SDT) sessions constituted 33% of the total number of minutes in the overall microcycles, or 965 minutes.



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Table 1

Microcycle program for belt wrestlers, focused on the pre-competition and general preparation phases

№	Microcycle indicators	Weeks			Total in stages
		I	II	III	
1.	Number of sessions	11	10	11	32
2.	Average duration of daily exercise (min.)	90	90	90	270
3.	Average training duration (min.)	990	900	990	2880
4.	UPT share (%, min.)	35%-335	35%-310	30%-320	33%-965
5.	MPT share (%, min.)	31%-325	30%-280	30%-320	30%-920
6	TTT percentage (%, min.)	33%-330	35%-310	40%-350	37%-990
7.	Psychological, emotional theoretical preparation	These types of training were carried out in accordance with the training course.			
Total					2880 min

Note: UPT-(general physical training); MPT-(special physical training); TTT-(technical-tactical training).

These indicators were also stable in terms of the proportion of MWT and TTT: MWT accounted for 30%, 920, and TTT accounted for 37%, 990. The methodology we developed proved effective. The first stage of pre-competition training for qualified belt wrestlers was a general training tool aimed at developing physical qualities and increasing the effectiveness of large-scale competitions (look Table 1).

The main goal of the special training stage was to improve the specialized knowledge, skills, and qualifications of belt wrestlers, in which technical and tactical training was carried out in a specific manner along with physical training. The content of these special training microcycles 1 and 2 did not differ significantly from the content of general training. However, in microcycles 3 and 4, the ratio of technical and tactical to physical training changed significantly. For example,

based on the total number of training sessions, the duration of daily training sessions was 90 minutes, and by the fourth week it increased to 135 minutes. The final volume was 536 minutes. The average training duration at each stage was 990 minutes, and by the fourth week, it had increased to 1,350 minutes, for a total of 4,320 minutes. By the second stage, the share of multi-day training sessions in the total number of microcycles was 36% of the total number of minutes, or 1,560 minutes (look Table 2).

Table 2

Microcycle schedule for belt-winning wrestlers during the pre-competition and special training stages

№	Microcycle indicators	Weeks				Total at the stage
		I	II	III	IV	
1	Number of sessions	11	11	11	10	43
2	Average duration of daily exercise (min.)	90	90	90	135	536
3	Average training duration (min.)	990	990	990	1350	4320
4	UPT share (%, min.)	30% -310	30%-310	20%-260	20%-290	23,75%-1170
5	MPT share (%, min.)	30% -335	30%-335	40%-360	40%-530	36,25%-1560
6	TTT percentage (%, min.)	40% -345	40%-345	40%-370	40%-530	41%-1590
7	Psychological, emotional theoretical preparation	These types of training were carried out in accordance with the training course.				
Total						4320 min

Note: UPT-(general physical training); MPT-(special physical training); TTT-(technical-tactical training).

It is generally accepted that the last stage of special training used in pre-competition preparation is the microcycle stage, which consists of 2 microcycles. The capabilities of belt wrestlers in special competition preparation were increased and the content of training loads was optimized. The results of the study show that the ratio of general and special training changed during the preparation process.

Table 3

Features of microcycles of pre-competition and special competition preparation of belt wrestlers

№	Microcycle indicators	Weeks		In total, in the phase
		I	II	
1	Number of sessions	11	11	22
2	Average duration of daily exercise (min.)	90	90	180
3	Average training duration (min.)	990	990	1980
4	UPT share (%, min.)	30%, 320	30%, 320	30%, 640

5	MPT share (%, min.)	30%, 320	30%, 320	30%, 640
6	TTT share (%, min.)	40%, 350	40%, 350	40%, 700
7	Psychological, emotional theoretical preparation	These types of training were carried out in accordance with the training course.		
Total				2035

Note: UPT-(general physical training); MPT-(special physical training); TTT-(technical-tactical training).

As the competition approaches, the proportion of competition-specific training increases, and training competitions become the primary preparatory activity. During the competition-specific preparation phase, the training load volume decreased and the intensity increased (look Table 3). During the pre-competition and general preparation phases, the belt wrestlers' physical qualities were prepared for competition by enhancing their technical and tactical skills. The main focus of the wrestlers' activities was also on improving their motor skills. During the pre-competition general preparation phase, UQS was repeated for 1 minute at a rate of 126-160 dice/min.

The training load volume, varying from 690 to 750, was increased in waves throughout the week. Therefore, during the pre-competition and competition phases, it was important to achieve success in the general preparation phase, using a mixed aerobic-anaerobic system, primarily focusing on general endurance training. During the study, training was conducted during the pre-competition and general preparatory phases using a circuit-based, alternating, and game-like approach. During the pre-competition and special preparatory phases, heart rates reached a range of 154 to 186 beats per minute during training loads. Loads of 730 to 790 beats per minute were added in waves each week. During the special pre-competition phase, the overall training load gradually decreased from 770 to 620 beats per minute. Competitions during training were organized as in a competitive environment. Competitions were held in intensity zone III at high speeds. Conducting such competitions has been shown to yield effective results in competitions (look Table 4).

From the special pre-competition phase, the loads were characterized by volume, with a decrease in volume and a gradual increase in intensity toward the third phase of training. However, special training exercises before and immediately before these phases are an exception. In general, in a dedicated pre-competition training environment, the absolute intensity of exercises increases along with speed, tempo, power, and other performance indicators, while the relative intensity of training also increases.

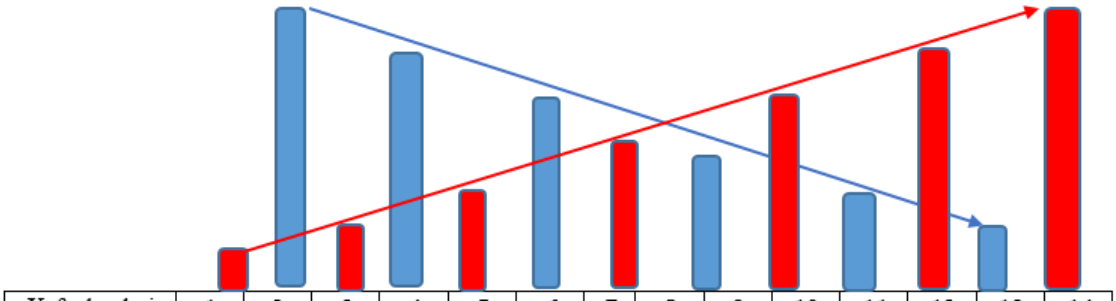
Table 4

Properties of microcycles in the pre-competition phase

№	General preparatory stage of microcycles characteristics before the competition			Features of microcycles during the special preparation phase before the competition				Pre-competition special competition preparation microcycles features	
Weeks	1-week	2-week	3-week	1-week	2-week	3-week	4-week	1-week	2- week

Load size	690-720	710-730	730-750	730-750	740-770	740-780	750-790	770-720	690-620
Download direction	Anaerobic	Anaerobic	Mixed aerobic-anaerobic	Anaerobic	Mixed aerobic-anaerobic	Mixed aerobic-anaerobic	Mixed aerobic-anaerobic	Mixed aerobic-anaerobic	Mixed aerobic-anaerobic

As a result of increasing training intensity and decreasing training volume, the average "waves" of the load index in the second stage are usually reduced to 3-4 weeks and are adjusted from the 2nd week in the pre-competition preparation phase. In the study conducted by us, in the preparation phase for the Uzbekistan Championship, we started with a load of 780 at the beginning of training from the 1st week and gave weekly waves of loads. From the 2nd week, the total volume of the training load decreased. The intensity of the competitions performed at the III intensity level was increased. The competitions that started between 3 and 4 minutes increased to 7 and 8 minutes by the end of the week. When the training intensity increased, the UQS increased from 160 to 186 beats/min in the 1st minute (look Figure 2).



Xafta kunlari	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Yuklama kattalgi	780	710	750	730	780	690		770	730	700	680	640	620	
Uchinchi shiddat zonasi	3-daq	4-daq	4-daq	4-daq	5-daq	4-daq	Dam olish	4-daq	5-daq	7-daq	7-daq	8-daq	8-daq	Dam olish

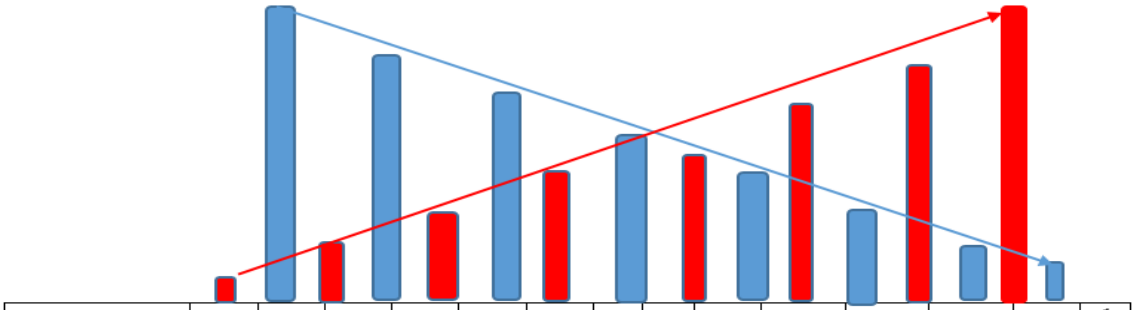
Figure 2. Sequence of weekly volume reduction and intensity increase during pre-competition training at the Uzbekistan Championship.

The methods used in the study yielded good results for belt-winning wrestlers competing at the Uzbekistan Championship. Preparation for the World Championship is also characterized by a number of complexities. These preparatory workouts were organized with increasing difficulty and, taking into account the sequence of exercises in several areas, were used in the following order:

- first, lactate-anaerobic (fast strength), then anaerobic-glycolytic exercises (exercises aimed at rapid endurance);
- first, lactate-anaerobic, then aerobic exercises (exercises aimed at general endurance);
- first, anaerobic-glycolytic (low volume), then aerobic exercises. We also described the training process in practice, using our methods, as follows:

It is assessed the duration and intensity, rest intervals between exercises, and their nature, as well as the number of repetitions and the coordination complexity of the exercise.

Exercises performed at maximum intensity but in small volumes generally develop speed-strength qualities, while exercises performed in large volumes or at high intensity for 30-120 seconds impact speed-endurance. In preparation for the World Championships, we increased the volume of work to the maximum, but with increased intensity, we extended the competition to intensity zone III from 5 minutes to 25 minutes. During the training, the UQS increased from 160 to 200 beats/min (look Fig. 3).



Xafta kunlari	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Yuklama kattalgi	880	810	850	790	880	750		820	770	720	700	680	630	
Uchinchi shiddat zonasi	5-daq	6-daq	5-daq	6-daq	6-daq	7-daq	Dam olish	7-daq	10-daq	10-daq	13-daq	13-daq	15-daq	Dam olish

Figure 3. Sequence of weekly volume reduction and intensity increase during the pre-competition preparation phase, World Championships.

This training load can also be determined by the direction of its impact on the body of wrestlers who have won belts. In our study, we examined training intensity in three zones: Zone I – predominantly aerobic, UQS – 140-150 rpm; Zone II – mixed: aerobic-anaerobic, UQS – 156-180 rpm; and Zone III – anaerobic-glycolytic, anaerobic-lactalvic, UQS reaching 186 rpm and higher. As a result, the total time of work performed in Zone I for the wrestler who won the B.A. belt No. 1 in our Table 4 was 28 minutes, representing 30% of the total time, and the load was 36 rpm. In Zone II, the training time was 52 minutes and 65% of the total time, with a workload of 536 repetitions. In Zone III, the athlete performed exercises for 10 minutes and 10% of the total time, with a workload of 210 repetitions. The training load of the wrestler who won the belt was 782 repetitions, which is classified as a high load.

It is broadly recognized that to determine the training load, the total load for one training session is calculated by adding the workloads of the group participants and dividing by the number of participants. This analysis allowed us to determine the volume of work performed per microcycle (look Table 5).

Table 5

Determining the training load of qualified wrestlers who won the belt in pre-competition preparation

№	S.N	The preparatory part is	Improving the execution of methods at slow	Improving the speed of execution of	Improving methods in counterattacking	Training competition (in conditions close to	Special exercises to develop the muscles of the	**Total**

	YUQS dice/min	130-145	145-170	156-180	156-180	186-198	120-130	
	Intensity zone	I	II	II	II	III	I	
	Intensity zone score	1-6	6-12	8-17	8-17	21-33	2-3	
	Time	**20**	**12**	**20**	**20**	**10**	**8**	**90**
1.	B.A .	19/1	26/8	27/10	28/12	31/21	20/2	782
2.	B. R .	20/2	24/6	26/8	28/12	31/21	21/3	746
3.	D. N.	19/1	25/7	26/8	29/14	30/17	19/1	792
4.	D. J .	20/1	26/8	27/10	29/14	29/14	20/2	712
5.	G. G.	21/3	27/10	26/8	29/14	31/21	21/3	754
6.	G. Sh.	20/2	26/8	25/7	28/12	31/21	21/3	764
7.	H.M.	20/2	26/8	26/8	28/12	30/17	20/2	763
8.	H. E.	21/3	26/8	26/8	28/12	30/17	20/2	752
9.	I. T.	21/3	27/10	25/7	27/10	31/21	19/1	720
10.	I. A.	20/2	26/8	26/8	28/12	32/25	18/1	760
11.	J. A .	20/1	25/7	27/10	29/14	32/25	20/2	765
12.	T. Kh.	19/2	24/5	26/8	29/14	32/25	19/1	692
13.	M. Z.	18/1	25/7	30/17	29/14	30/17	20/2	798
14.	Sh. N .	20/2	26/8	26/8	28/12	32/25	19/1	730
15.	N. F .	20/2	26/8	24/6	28/12	30/17	19/1	674
16.	A.I .	21/3	27/10	25/7	29/14	30/17	21/3	775
17.	B. S.	19/1	26/8	26/8	28/12	31/21	19/1	782
18.	Sh. N.	20/2	27/10	27/10	27/10	31/21	19/1	668
							740 download directory	

Note: F.I. (abbreviation of the last name and first name of the belt wrestlers of the experimental group)

When developing the pre-competition training plan, a series of training sessions were developed to comprehensively address the objectives set during the microcycle stage and were conducted over several days. A weekly microcycle was developed to align with the participants' weekly calendar and overall regimen. The structure of the microcycles was linked to the training process, depending on the objectives of each stage. The order of exercises was developed based on the primary and secondary competitions, and the training load varied depending on rest intervals. Based on the types of microcycles and their specific characteristics, the following were defined in the training process: pulling, impact, approximation, pre-competition, competition recovery, and preparatory.

a) Pulling microcycle: consists of light loads and is aimed at introducing the athlete's body to intense training. These were used during the base period (general preparation).

b) Shock microcycle: aimed at intensively performing a large volume of workload, the

main goal of which was to help the wrestlers' bodies adapt to the process of solving basic technical and tactical, physical, moral, volitional, special psychological, and holistic problems.

c) Approximate (model) microcycle: important because its main goal was to get closer to the competition.

d) Pre-competition microcycles were conducted primarily with technical and tactical preparation.

e) The recovery microcycle before the competition included recovery activities prior to the competition (look Table 6).

The general physical preparation of a belt wrestler is the foundation for achieving high results and is considered the most essential basic factor. Its main goal is the following: the comprehensive and harmonious development of the belt wrestler's body, increasing their functional capabilities, developing physical qualities, and improving health. The correct use of active rest during periods of intense training and competitive loads is also considered a means of general physical preparation. These tools include exercises performed on equipment and with a partner on special exercise machines, as well as general development exercises borrowed from other sports: acrobatics, track and field, sports games, swimming, others.

Table 7.

Dynamics of growth in physical fitness indicators of belt wrestlers in the control and experimental groups in the 75-82 kg weight category at the beginning of the pedagogical study.

№	Control exercises	Control group (n=18)			Experience group (n=18)			t	P
		$\overline{X}$	σ	V, %	$\overline{X}$	σ	V, %		
1.	30-meter dash, s.	6,37	0,80	12,55	6,27	0,81	12,91	1,37	>0,05
2.	High jumps in 10 seconds times	12,44	1,69	13,58	12,56	1,76	13,99	1,19	>0,05
3.	Pull-ups on the horizontal bar in 10 seconds, times	7,11	1,04	14,63	7,22	1,08	14,95	1,31	>0,05
4.	Bend and straighten your arms in 10 seconds, times	12,61	1,46	11,58	12,50	1,49	11,92	1,23	>0,05
5.	Standing back bends (bridge) in 10 seconds, times	4,39	0,64	14,58	4,33	0,65	14,98	1,26	>0,05
6.	Walking 10 m. in bridge position, s.	12,72	1,73	13,60	12,44	1,74	13,98	1,48	>0,05

The relative increase in physical performance in the control and experimental groups at the beginning of the study was as follows: 30-meter sprint (sec) t=1.37; P>0.05. High jumps in 10 seconds (time) t=1.19; P>0.05. Pull-ups on a horizontal bar in 10 seconds (time) t=1.31; P>0.05, flexion and extension of arms in 10 seconds (time) t=1.23; P>0.05. Accordingly, standing backward bend in 10 seconds (bridge) (time) t=1.26; P>0.05 and 10-meter walk in a bridge position (sec) t=1.48; P>0.05 (look Table 7).

When assessing the effectiveness of technical movements of qualified belt wrestlers, it is necessary to take into account the ratio of their physical qualities and the level of their reserve capabilities. The level of their technical skills is determined by the level of improvement of

physical quality indicators and technical and tactical training in the reserve. The level of technical and tactical skills of belt wrestlers and the level of improvement of general and special physical quality indicators are expressed by the indicators of technical and tactical movements performed in competitions. The number of repetitions of improved technical movements during training and the time allocated for them are explained by the expansion of their opportunities to develop their skills and achieve mastery.

Technical methods of belt wrestlers in the control and experimental groups at the beginning of the study, t-test and P > reliability indicators: knee lift (sec) – t = 1.49; P > 0.05; knee block (sec) – t = 1.62; P > 0.05; throw with return (sec) – t = 1.42; P > 0.05; throw with chest rise (sec) – t = 1.38; P>0.05, indicating the reliability of our study (look Table 8).

Table 8

Growth dynamics of 10-time right-handed technique execution in belt wrestlers in the 75-82 kg weight category at the beginning of the pedagogical study

№	**Technical method**	**Control group (n=18)**			**Experience group (n=18)**			t	P
		$\overline{X}$	σ	V, %	$\overline{X}$	σ	V, %		
1.	Knee lift, times	60,52	0,16	10,58	60,55	0,17	10,98	1,49	>0,05
2.	Blocking with a knee, times	58,69	0,21	12,56	59,64	0,21	12,96	1,62	>0,05
3.	Rejection, times	60,74	0,25	14,56	60,77	0,27	14,99	1,42	>0,05
4.	Exaggeration, times	57,31	0,18	13,53	58,29	0,18	13,85	1,38	>0,05

It is commonly observed that our research in this chapter demonstrated that the effectiveness of the control exercises conducted at the NG and TG levels was high. In the fourth chapter of the dissertation, entitled "The Effectiveness of Optimizing the Ratio of General and Specialized Physical and Technical Fitness of Qualified Belt Wrestlers Over the Course of a Year," the main objectives of the study were to develop a program for optimizing the ratio of general and specialized physical fitness of qualified belt wrestlers and determine its effectiveness based on experience, study the cumulative effects of training, and provide a number of conclusions and practical recommendations. During the main pedagogical experimental trials, the dynamics of growth and development were monitored, aimed at improving the technical skills of qualified belt wrestlers, based on the identification of general and special exercises used in training for qualified belt wrestlers. Thirty-six qualified wrestlers participated in the experiment, and the research was conducted by dividing the participants into experimental and control groups. Each group consisted of 18 wrestlers. The primary objectives of the study were to develop a program to optimize the balance of general and specialized physical fitness in qualified belt wrestlers, determine the effectiveness of training based on experimental testing and impact studies, and formulate a number of conclusions and practical recommendations. The study optimized loads using exercises to increase speed, develop strength, endurance, agility, and flexibility, and determined their effectiveness. Specifically, the direction of influence of loads used in training qualified belt

wrestlers was determined, and a mathematical analysis of the effectiveness of the optimally planned and incorporated UPT and MPT exercises was conducted. These were included in training sessions throughout the year, at the beginning and end of the study.

Table 9

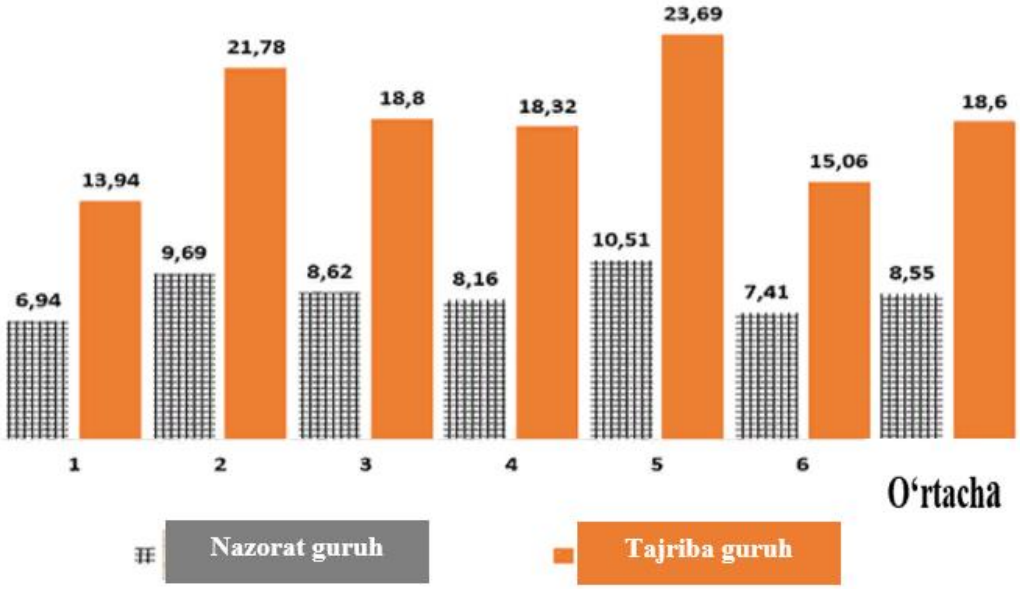
Analysis of physical fitness indicators for belt wrestlers in the control and experimental groups in the 75-82 kg weight category based on the results of the pedagogical study

№	Control exercises	Control group (n=18)			Experience group (n=18)			t	P
		$\overline{X}$	σ	V, %	$\overline{X}$	Σ	V, %		
1.	30 meter run, s.	5,93	0,72	12,14	5,40	0,66	12,13	2,32	<0,05
2.	High jumps in 10 seconds times	13,65	1,79	13,11	15,29	2,01	13,15	2,59	<0,05
3.	Pull-ups on the horizontal bar in 10 seconds, times	7,72	1,09	14,11	8,58	1,21	14,10	2,23	<0,05
4.	Bend and straighten your arms in 10 seconds, times	13,64	1,52	11,14	14,79	1,65	11,16	2,17	<0,05
5.	Standing back bends (bridge) in 10 seconds, times	4,85	0,69	14,12	5,36	0,76	14,18	2,11	<0,05
6.	Walking 10 m. in bridge position, s.	11,78	1,55	13,16	10,57	1,39	13,15	2,47	<0,05

According to the results of the assessment of the physical fitness indicators of the group of respondents who participated in the NG, following the results of the study: in 30-meter run - 5.93±0.72 sec.; V-12.14%; in high jump in 10 seconds - 13.65±1.79 times; V-13.11%; in pull-ups on a bar in 10 seconds - 7.72±1.09 sec.; V-14.11%; in arm curls in 10 seconds (times) - 13.64±1.52 sec.; V-11.14%; and, accordingly, in backward bends from a standing position, bridge in 10 seconds - 4.85±0.69 sec.; V-14.12%; in the bridge position, 10 m walking - 11.78±1.55 sec.; The respondents in TG had a V-13.16% compared to NG. The results of physical fitness indicators obtained at the end of the study were as follows: 30-meter run 5.40±0.66 sec; V-12.13%; high jump in 10 seconds 15.29±2.01 sec; V-13.15%; pull-ups on a bar in 10 seconds 8.58±1.21 sec; V-14.10%; flexion and extension of arms in 10 seconds 12.79±1.65; V-11.16%; and, respectively, backward bends in 10 seconds while standing 5.36±0.76 sec; V-14.18%; 10-meter walk in a bridge position 10.57±1.39 sec; An increase of 13.15% was demonstrated. These indicators demonstrated the effectiveness of the method we supported (look Table 9).

The relative increase in the physical fitness indicators of the wrestlers participating in the NG by the end of the study was: 30-meter run - 6.94 sec; 10-second high jump - 9.69 sec; 10-second pull-ups - 8.62 sec; 10-second arm curls - 8.16; 10-second standing backward bend - 10.51 sec; and 10-meter bridge walk - 7.41 relative increase. The overall relative increase was 8.55. It is evident from existing research that the relative increase in the physical fitness indicators of the

wrestlers participating in the TG by the end of the study was: 30-meter run - 13.94 sec; 10-second



high jump - 21.78 sec; 10-second pull-ups – 18.8 times; 10-second push-ups with bent and straight arms – 18.32 sec; 10-second standing backward bends – 23.69 sec; and 10-meter bridge walk – a relative increase of 15.06 was achieved. The overall relative increase was 18.06, which is significantly lower than that of wrestlers who received belts in NG, demonstrating the reliability of our experimental test (look Figure 4).

Figure 4. Relative growth dynamics of physical fitness of belt wrestlers in the control and experimental groups in the 75-82 kg weight category at the end of the pedagogical study

At the end of the study, the physical fitness indicators of the foreign wrestlers in the experimental and control groups were re-evaluated and analyzed. Based on the physical fitness results of the foreign wrestlers from the experimental and control groups at the beginning and end of the study, as well as their statistical characteristics, the reliability of their changes during the pedagogical pilot testing was determined. Observation methods for qualified foreign wrestlers were used, and the effectiveness of the optimized ratio of MHT in the training of foreign wrestlers over the course of a year was determined in terms of optimizing the training program.

The indicators of the subjects from the control group, who performed technical moves 10 times, at the end of the study were as follows: throw with knee lift 59.42 ± 0.14 sec; B - 10.10%; throw with blocking with knee 57.55 ± 0.19 sec; B - 12.13%. Return throw technique performance: 59.60±0.23 sec; V-14.13%; and over-the-shoulder throw technique: 56.19±0.16 sec; V-13.18%. The results of 10-time right throw technique performance by subjects from the control group at the end of the study were as follows: knee lift technique: 52.33±0.13 sec; V-10.11%; knee lock technique: 57.37±0.17 sec; V-12.13%; return technique: 59.49±0.21 sec; V-14.16%; and over-the-shoulder throw technique: 56.05±0.14 sec; V-13.09% (look Table 10).

Table 10

Performance indicators of 10-times right-handed technical moves by wrestlers in the control and experimental groups in the 75-82 kg weight category at the end of the pedagogical study.

№	Technical method	Control group (n=18)	Experience group (n=18)	t	P

		$\overline{X}$	σ	V, %	$\overline{X}$	σ	V, %		
1.	Knee lift, times	59,42	0,14	10,10	52,33	0,13	10,11	2,76	<0,01
2.	Blocking with a knee, times	57,55	0,19	12,13	54,37	0,17	12,14	3,10	<0,01
3.	Rejection, times	59,60	0,23	14,13	56,49	0,21	14,16	2,51	<0,05
4.	Exaggeration, times	56,19	0,16	13,18	54,05	0,14	13,09	2,78	<0,01

The relative increase in the performance of 10 technical techniques to the right by the NG subjects at the end of the study was: 6.94 seconds for the knee lift; 8.16 seconds for the knee block; 7.93 seconds for the return throw; and 8.93 seconds for the chest push. The overall relative increase at the end of the study was 7.99. It increases in the performance of 10 technical techniques to the right by the TG subjects at the end of the study was: 14.39 seconds for the knee lift; 16.84 seconds for the knee block; 16.03 seconds for the return throw; and 18.0 seconds for the chest push. This proved that NG achieved relatively reliable growth, with an overall relative growth rate of 16.32 at the end of the study (look Figure 5).

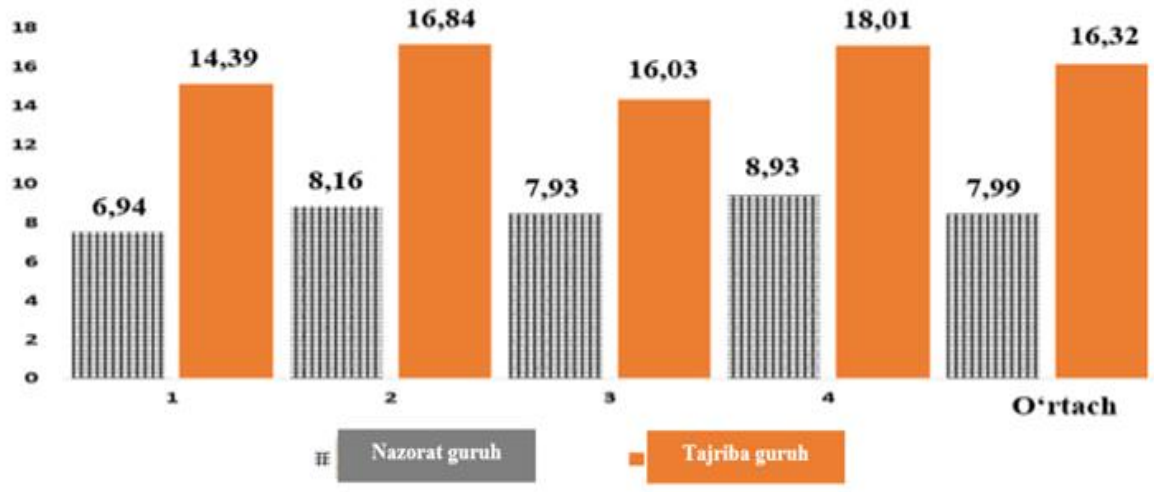


Figure 5. Dynamics of the relative growth of wrestlers who won belts in the control and experimental groups in the 75-82 kg weight category when performing right-hand techniques 10 times by the end of the pedagogical study

In conclusion, it can be said that our many years of pedagogical experience are scientifically substantiated and serve as a scientific basis for achieving high results in qualified wrestlers who have won belts.

CONCLUSIONS

Based on the study of the collected literary sources on the topic of the dissertation, observations, research, pedagogical testing, and analysis of the results of the pedagogical experience, the following conclusions can be drawn:

1. A literature review revealed that during the preparation period for major competitions, in the microcycles of the mesocycle (pull, strike, and approach), compared to pre-competition training, insufficient scientific approaches to planning the tools and methods for achieving success

in competitions by wrestlers who have won belts were identified.

The methods used during the pre-competition preparation stage, their focus, and the rational use of tools increased the effectiveness of training to the maximum level. To maintain a steady rate of growth in general and specialized skills, it was determined that it was necessary to periodically, that is, every 2-3 weeks, update the training content and vary the nature of the load.

2. By teaching qualified belt wrestlers feints during pre-competition preparation, performing tactical movement elements during competitions, using distracting movement options before initiating complex offensive moves, and developing tactical movements aimed at creating a favorable dynamic situation by disrupting the opponent's attack, a 13.7-16.4% increase in technical moves more characteristic of flexibility and agility was achieved. As a result, an increased probability of victory over an opponent in critical situations was noted.

3. Improving offensive movements and performing technical and tactical movements during the pre-competition preparation of belt wrestlers; The use of special exercises selected for each situation, the formation of competition preparation tactics, the application of the main methods of preparation for the pre-competition mesocycle, the combination of a sequence of counter-offensive techniques in a favorable situation through the initial defense, the improvement of the second throw with the knee by 10 times before the experiment: TG was 60.55±0.17, B-10.98%, and by the end of the study - 52.33±0.13, B-10.11%. NG was 60.52±0.16, B-10.58%, and by the end of the study - 59.42±0.14, B-10.10%. The efficiency of performing lifting and blocking techniques with the knee increased by 13.6-15.9%.

4. During the training, it was established that the physical fitness of the experimental group significantly improved compared to that of the control group. The study revealed that the positive changes in the corresponding indicators in the TR (the average relative increase in the group for the studied tests was 18.60%, i.e., 10.05 times compared to the NG) were higher and statistically significant compared to the positive changes in the pedagogical experience of the NG subjects for the studied tests (the average relative increase in the group for the studied tests was 8.55%) (changes in the NG for two tests at a normal significance level of $P < 0.05$). These indicators confirmed the effectiveness of the program used in the TR.

5. When distributing the training loads, the sequence of exercises in different directions was taken into account. Research has shown that high competition results can be achieved by performing exercises in the following sequence: first, lactate-anaerobic (speed-strength) exercises, then anaerobic-glycolytic exercises (exercises aimed at speed endurance), lactate-anaerobic exercises, then aerobic exercises (exercises aimed at general endurance), anaerobic-glycolytic (in small volumes), then aerobic exercises.

6. Depending on the direction of the impact of this training load on the athlete's body, the intensity of work can usually be calculated in three zones: Zone I - predominantly aerobic, UQS 140-150 beats/min; Zone II - mixed: aerobic-anaerobic, UQS 156-180 beats/min; and Zone III - anaerobic, UQS 186 beats/min and higher. The total time spent in Zone 1 was 28 minutes and 30% of the total time, with a load of 36 standard units. In Zone 2, the training time was 52 minutes and 65% of the total time, with a load of 536 standard units. In Zone 3, the athlete performed work for 10 minutes and 10% of the total time, with a load of 210 standard units. The athlete's training load was 782, which scientifically justifies organizing the training as a high-load in this formula.

7. It was found that the methods and tools used by TG wrestlers throughout the year were significantly more effective than those used by NG wrestlers. This, in turn, allowed for the optimization of the level of physical fitness of qualified wrestlers and improved planning of

training loads, the rational use of training in quantitative areas, the increase in the effectiveness of training programs, and the prevention of symptoms of fatigue.

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A STAGE-BASED APPROACH TO DEVELOPING STUDENTS' ECOLOGICAL CULTURE THROUGH BIOLOGY EDUCATION

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Abstract. *Environmental challenges require biology education to foster not only scientific knowledge but also students' ecological culture and environmentally responsible behavior. This study proposes a stage-based approach to developing students' ecological culture through biology education by integrating cognitive, affective, behavioral, and value-oriented dimensions of environmental learning. Using theoretical analysis, comparative evaluation, and synthesis of pedagogical literature, the study identifies the key stages and instructional conditions necessary for the gradual formation of ecological culture. The proposed approach emphasizes the progressive development of environmental awareness, attitudes, and practical competencies through learner-centered teaching, reflective learning, and real-life ecological activities. The findings suggest that a stage-based pedagogical approach enhances the effectiveness of biology education by supporting the systematic development of environmental literacy and sustainable values. The proposed framework can serve as a methodological foundation for curriculum development, biology teaching, and future research in environmental education.*

Keywords: *biology education, ecological culture, environmental literacy, sustainable development, competence-based education, pedagogical model.*

Introduction. The growing intensity of environmental degradation has transformed ecological education into one of the central priorities of contemporary educational systems. Climate change, biodiversity decline, environmental pollution, and the depletion of natural resources have demonstrated that scientific knowledge alone is insufficient to address global sustainability challenges. Educational institutions are therefore expected not only to provide learners with ecological knowledge but also to foster environmental responsibility, ethical awareness, and the ability to make informed decisions that support sustainable development.

Among school disciplines, biology occupies a particularly important position because it explains the structure and functioning of living systems while revealing the complex relationships between humans and the natural environment. Through the study of biological processes, ecosystems, and biodiversity, students acquire scientific knowledge that can become the foundation for environmentally responsible attitudes and behavior. Consequently, biology education offers favorable pedagogical conditions for integrating scientific inquiry with value-oriented environmental learning.

Despite the growing emphasis on environmental education, classroom practice frequently reveals a considerable gap between students' ecological knowledge and their everyday environmental behavior. Learners often demonstrate satisfactory academic achievement in biological sciences while showing limited willingness to apply ecological principles in real-life situations. This discrepancy indicates that the formation of ecological culture extends beyond the acquisition of factual knowledge and requires the systematic development of values, motivation, practical competencies, and personal responsibility.

Recent pedagogical research increasingly characterizes ecological culture as a multidimensional personal attribute that integrates cognitive, emotional, ethical, behavioral, and reflective dimensions of learning. From this perspective, ecological culture should be understood as a dynamic developmental process rather than a fixed educational outcome. Such an interpretation requires instructional approaches capable of supporting students' gradual progression from elementary environmental awareness to independent ecological decision-making and responsible participation in sustainable practices.

A stage-based pedagogical approach provides an appropriate theoretical foundation for achieving this objective. It assumes that ecological culture develops progressively through interconnected educational stages, each characterized by specific learning objectives, instructional strategies, and expected developmental outcomes. Rather than viewing environmental education as a collection of isolated activities, this approach emphasizes continuity, consistency, and developmental progression throughout the learning process. It also enables teachers to select pedagogical methods that correspond to students' cognitive readiness, individual needs, and evolving environmental competencies.

Accordingly, the present study aims to develop and theoretically substantiate a stage-based approach to fostering students' ecological culture through biology education. Specifically, the study seeks to identify the pedagogical conditions, instructional strategies, and developmental stages that facilitate the systematic formation of ecological culture within competence-oriented biology instruction. By integrating environmental literacy, learner-centered pedagogy, and sustainable development principles into a unified conceptual framework, the proposed approach contributes to the modernization of biology education and provides methodological guidance for researchers, curriculum designers, and practicing teachers.

Literature Review. Over the past decades, the concept of *ecological culture* has expanded considerably in educational research. Earlier studies primarily associated ecological culture with environmental awareness and the acquisition of ecological knowledge. Contemporary scholarship, however, increasingly interprets it as a multidimensional educational construct that integrates scientific literacy, environmental values, ethical responsibility, practical competencies, and environmentally responsible behavior. This broader interpretation reflects the transition from knowledge-oriented instruction toward competence-based education, where learning outcomes are assessed not only by what students know but also by how effectively they apply that knowledge in real-life situations. Within competence-oriented educational systems, ecological culture is regarded as an essential indicator of learners' readiness to participate in sustainable development. Consequently, environmental education is expected to cultivate critical thinking, value-based decision-making, and active civic engagement alongside scientific understanding. Such expectations have significantly expanded the pedagogical role of biology education, positioning it as one of the principal disciplines for promoting environmental literacy and ecological responsibility. Biology education provides a particularly favorable context for fostering ecological culture because it naturally connects theoretical knowledge with authentic environmental phenomena. Through the study of ecosystems, biodiversity, population dynamics, genetics, and interactions between organisms and their environments, students gain opportunities to understand the complexity of natural systems and the consequences of human activities. Nevertheless, many educational studies indicate that the acquisition of biological knowledge alone does not necessarily lead to environmentally responsible behavior. Students frequently demonstrate satisfactory academic performance while remaining

passive toward environmental protection or sustainability-related issues. This inconsistency suggests that environmental competence cannot be achieved solely through the transmission of scientific information. Instead, it requires educational experiences that encourage learners to internalize ecological values, develop emotional connections with nature, and apply scientific knowledge through meaningful practical activities. Accordingly, recent pedagogical approaches increasingly emphasize learner-centered instruction, inquiry-based learning, collaborative environmental projects, and reflective practice as effective strategies for strengthening ecological competence within biology education.

One of the most significant ideas emerging from contemporary environmental pedagogy is that ecological culture develops progressively rather than instantaneously. Educational researchers increasingly recognize that students pass through successive developmental stages in which ecological knowledge, values, attitudes, and behavioral patterns gradually become more integrated and internally regulated.

A stage-based perspective assumes that each phase of development establishes the foundation for subsequent learning. Initial educational experiences primarily focus on cultivating environmental awareness and positive emotional attitudes toward nature. As learners acquire greater experience, educational priorities shift toward repeated practical engagement, behavioral stabilization, reflective evaluation, and ultimately independent ecological decision-making. This developmental perspective differs substantially from traditional instructional models that concentrate primarily on increasing the volume of ecological information. Instead of treating environmental education as a sequence of isolated lessons, stage-based pedagogy views it as a continuous process of personal development in which cognitive, emotional, behavioral, and reflective dimensions evolve simultaneously.

Such continuity enables teachers to select instructional methods that correspond to learners' developmental readiness while ensuring that educational interventions remain coherent throughout the learning process. The effectiveness of ecological education depends not only on curriculum content but also on the pedagogical conditions under which learning occurs. Previous studies consistently emphasize that successful environmental education requires continuity, systematic instructional support, active student participation, and opportunities for authentic environmental experience. Practical investigations, field observations, laboratory activities, collaborative projects, environmental campaigns, and inquiry-based learning have been identified as particularly valuable because they enable students to connect scientific concepts with real environmental situations. Such experiences reinforce theoretical understanding while simultaneously strengthening environmental responsibility, teamwork, communication, and problem-solving abilities. Furthermore, educational effectiveness increases when teachers gradually modify instructional strategies according to students' developmental progress. During the early stages, teacher guidance and demonstration remain essential, whereas advanced learners benefit from greater independence, research-oriented activities, and opportunities to design solutions for authentic environmental problems. This gradual transition from teacher-directed instruction to learner autonomy represents one of the defining characteristics of competence-oriented environmental education.

lthough numerous studies have examined environmental education, ecological literacy, and competence-based biology teaching, relatively few investigations have proposed an integrated pedagogical framework explaining how ecological culture develops progressively throughout different stages of students' learning. Existing research often concentrates on individual teaching

methods, environmental projects, or isolated competencies without clearly describing the developmental relationships among ecological knowledge, environmental values, practical experience, and responsible behavior.

Moreover, limited attention has been given to aligning instructional strategies with learners' developmental readiness within a coherent stage-based framework. This limitation reduces the practical applicability of many existing approaches in curriculum planning and classroom implementation. To address this gap, the present study develops a stage-based pedagogical approach that conceptualizes ecological culture as a continuously evolving educational process. The proposed framework integrates cognitive, affective, behavioral, and reflective dimensions of learning into a unified instructional system designed specifically for competence-oriented biology education. By establishing clear relationships between developmental stages, pedagogical conditions, instructional strategies, and expected learning outcomes, the study provides a comprehensive theoretical foundation for improving environmental education in contemporary schools.

Research Methodology. This study adopts a qualitative conceptual research design aimed at developing and theoretically substantiating a stage-based approach to fostering students' ecological culture through biology education. Rather than evaluating the effectiveness of a specific instructional intervention, the research seeks to construct a coherent pedagogical framework that explains how ecological culture develops progressively within competence-oriented biology education. The research is grounded in the assumption that ecological culture is not a static educational outcome but a dynamic developmental process shaped by the interaction of cognitive, affective, behavioral, and reflective learning. Accordingly, the study applies a systems perspective, viewing biology education as an integrated pedagogical environment in which instructional objectives, learning activities, teaching methods, and assessment strategies function as interdependent components of students' ecological development. Unlike descriptive approaches that examine isolated teaching techniques, the present research emphasizes the developmental relationships among different dimensions of ecological culture and explores how these dimensions evolve through successive stages of learning.

The study is based on an extensive analysis of pedagogical literature addressing environmental education, biology teaching, competence-based learning, and ecological culture formation. Particular attention was given to theoretical and methodological publications describing the developmental characteristics of ecological culture and the pedagogical conditions that facilitate environmentally responsible learning. The reviewed literature was examined to identify common instructional principles, developmental stages, pedagogical strategies, and expected learning outcomes. Rather than reproducing existing classifications, the analysis synthesized their conceptual foundations into a unified framework suitable for contemporary biology education. To achieve the objectives of the study, several complementary qualitative research methods were employed. The research began with a comprehensive examination of scientific publications devoted to environmental education, ecological literacy, competence-based instruction, and developmental pedagogy. This analysis enabled the identification of theoretical principles explaining the gradual formation of ecological culture within biology education. A comparative approach was applied to examine similarities and differences among existing pedagogical perspectives on ecological culture development. The analysis focused on identifying common developmental patterns, instructional priorities, and methodological approaches reported in previous studies. Special attention

was paid to understanding how educational objectives evolve from promoting elementary environmental awareness to fostering independent ecological responsibility and sustainable decision-making.

Following the analytical phase, the identified concepts were integrated using a systems-oriented synthesis. This approach enabled the organization of instructional goals, pedagogical conditions, learner activities, and educational outcomes into a coherent conceptual structure. The synthesis further demonstrated that meaningful ecological learning depends on the balanced interaction of scientific knowledge, practical experience, environmental values, and reflective thinking rather than on isolated instructional activities.

The final methodological stage involved constructing a stage-based pedagogical framework describing the sequential development of ecological culture. Conceptual modelling was employed to establish logical relationships among developmental stages, instructional methods, learner characteristics, and expected educational outcomes.

The resulting framework illustrates how biology education can facilitate students' gradual progression from environmental awareness to autonomous ecological responsibility through systematically organized educational experiences.

The proposed framework is based on several complementary pedagogical principles that collectively ensure the continuity and effectiveness of ecological culture formation. The principle of continuity assumes that ecological culture develops progressively throughout the educational process. Each developmental stage establishes the prerequisites necessary for subsequent learning, ensuring coherence between educational experiences. The learner-centered principle recognizes individual differences in students' environmental awareness, motivation, prior experience, and learning pace. Consequently, instructional methods should remain sufficiently flexible to address diverse developmental needs while supporting individual educational trajectories. The principle of integration emphasizes that ecological education should extend beyond classroom instruction. Biological knowledge becomes educationally meaningful when reinforced through laboratory investigations, field observations, extracurricular projects, community engagement, and authentic environmental experiences. The activity-oriented principle maintains that ecological competence develops most effectively through active participation. Inquiry-based learning, scientific investigation, project work, environmental monitoring, and collaborative problem-solving therefore occupy central positions within the proposed pedagogical framework. Finally, the principle of reflective development highlights reflection as an essential mechanism connecting ecological knowledge with responsible environmental behavior. Through reflection, learners critically evaluate their own environmental decisions, values, and actions, thereby transforming scientific understanding into sustainable personal responsibility.

The proposed framework further suggests that successful progression between developmental stages occurs only when scientific knowledge is consistently reinforced through practical engagement, emotional involvement, and reflective evaluation. This integrated perspective strengthens the theoretical foundations of competence-oriented biology education while supporting the broader objectives of environmental sustainability. Trustworthiness of the Framework. The credibility of the proposed framework is ensured through the systematic integration of contemporary pedagogical theory and the internal consistency of its conceptual structure. Each developmental stage is explicitly associated with corresponding instructional objectives, pedagogical strategies, learner activities, and anticipated educational outcomes, thereby providing a coherent explanation of ecological culture formation. Rather than presenting ecological education as a collection

of separate instructional techniques, the framework offers a unified pedagogical perspective that aligns biology education with competence-based learning and the principles of sustainable development. This methodological coherence enhances both its theoretical validity and its potential applicability in educational practice.

The principal methodological contribution of this study lies in the development of an integrated stage-based approach that conceptualizes ecological culture as a continuously evolving educational process. Unlike traditional instructional models that focus predominantly on ecological knowledge acquisition, the proposed framework establishes dynamic relationships among scientific literacy, environmental values, practical experience, reflective thinking, and responsible ecological behavior. As a result, it provides a comprehensive theoretical foundation for designing biology curricula that promote both scientific competence and sustainable environmental responsibility.

Results and Discussion. The analysis indicates that ecological culture should be regarded as a dynamic educational outcome that evolves progressively through purposeful pedagogical support rather than as a competency acquired immediately after learning ecological concepts. This finding reinforces the view that biology education contributes to sustainable development only when scientific knowledge is systematically transformed into environmentally responsible attitudes, values, and behavioral practices. The proposed stage-based approach conceptualizes ecological culture as a continuous developmental process in which students gradually progress from acquiring elementary environmental awareness to demonstrating autonomous ecological responsibility. Each developmental stage performs a distinct pedagogical function while simultaneously reinforcing competencies established during previous stages. Consequently, ecological learning should be organized as an interconnected educational continuum rather than a sequence of independent instructional activities. Unlike conventional approaches that predominantly evaluate students' cognitive achievements, the proposed framework emphasizes balanced development across four complementary dimensions: scientific understanding, environmental values, practical ecological competence, and reflective decision-making. The interaction among these dimensions determines the overall effectiveness of ecological culture formation. The conducted analysis demonstrates that the effectiveness of biology education depends on the logical progression of instructional objectives across successive developmental stages. Each stage introduces new educational priorities while preserving continuity with previously acquired competencies.

The initial stage is primarily concerned with cultivating students' awareness of environmental issues and establishing positive emotional relationships with nature. At this level, learning is largely supported through teacher modelling, classroom demonstrations, observation, and guided participation in simple ecological activities. The teacher plays a particularly significant role during this stage because students frequently construct their first environmental attitudes by observing the behavior and values demonstrated by adults. Therefore, pedagogical influence extends beyond the transmission of scientific knowledge to include the modelling of environmentally responsible practices.

The expected outcomes of this stage include:

acquisition of basic ecological concepts;

development of curiosity about biological and environmental phenomena;

formation of positive emotional attitudes toward nature;

initial understanding of environmentally responsible behavior.

Following the development of environmental awareness, instructional priorities gradually shift toward repeated practical engagement. Students participate in laboratory investigations, field observations, environmental monitoring, school gardening activities, and collaborative ecological projects that allow them to apply theoretical knowledge within authentic contexts. Regular participation in such activities enables environmentally responsible actions to become habitual rather than externally imposed. As practical experiences accumulate, students increasingly associate ecological knowledge with everyday decision-making.

At this developmental stage, instructional strategies should emphasize:

experiential learning;

collaborative problem-solving;

project-based activities;

inquiry-oriented investigations;

reflective classroom discussions.

These educational experiences strengthen not only ecological knowledge but also responsibility, self-regulation, and cooperative learning skills.

The third stage represents a significant qualitative transformation in students' ecological development. Environmentally responsible behavior becomes progressively internalized, reflecting personal values rather than external supervision. Students begin participating voluntarily in environmental campaigns, biodiversity conservation activities, ecological research projects, and community initiatives. Their motivation increasingly originates from ethical responsibility rather than teacher expectations.

Conclusion. This study proposed a stage-based approach to developing students' ecological culture through biology education. The findings indicate that ecological culture is formed through the gradual integration of ecological knowledge, environmental values, practical experience, and reflective thinking. The proposed framework emphasizes the importance of organizing biology education as a continuous developmental process that promotes not only scientific literacy but also environmentally responsible behavior. The study contributes to competence-based biology education by providing a theoretical foundation for strengthening environmental education and supporting the goals of sustainable development. Future research should focus on empirically evaluating the effectiveness of the proposed approach in different educational settings.

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A METHODOLOGICAL SYSTEM FOR DEVELOPING KEY COMPETENCIES IN GRADE 8 STUDENTS THROUGH THE HISTORY OF UZBEKISTAN: A CONCEPTUAL STUDY

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Abstract. *This conceptual study proposes a methodological system for developing key competencies in Grade 8 students through the History of Uzbekistan. It responds to a familiar problem in competency-based reform: standards may describe broad outcomes, while classroom practice still rewards the reproduction of factual knowledge. The model brings together pedagogical systems theory, competency-based education, historical-thinking research, and the current outcome-oriented regulatory framework in Uzbekistan. It treats historical thinking as the disciplinary setting in which broad competencies become visible through sourcing, contextualization, corroboration, causal explanation, comparison, argumentation, perspective taking, civic interpretation, and reflection. Four connected components are defined: target/outcome, content, process/technology, and assessment/reflection. The study is theoretical rather than experimental; no measured effect on students is claimed. Its main contribution is an operational framework that links competencies to history tasks and observable evidence of learning, offering a basis for lesson design, teacher development, and later empirical testing.*

Keywords: *methodological system; key competencies; competency-based education; History of Uzbekistan; historical thinking; historical literacy; formative assessment.*

1. Introduction

Competency-oriented curriculum reform has shifted attention from what learners can reproduce to what they can do with what they know. International frameworks describe competence as an integrated capacity involving knowledge, skills, values, attitudes, agency, collaboration, reflection, and transfer across contexts (Council of the European Union, 2018; Marope et al., 2017; OECD, 2019). Yet competency language by itself does not alter classroom practice. Where lessons, textbooks, and assessment continue to privilege recall, broad outcomes such as communication, information use, citizenship, or self-development may remain largely declarative.

History makes this tension especially visible. The subject necessarily includes dates, people, concepts, and sequences of events, but disciplinary understanding depends on more than factual retention. Students also need to ask historical questions, work with sources, distinguish evidence from assertion, explain cause and consequence, recognize continuity and change, consider historical perspectives, and justify interpretations. Research on historical thinking shows that these practices can be taught when they are explicitly scaffolded and repeatedly used in meaningful tasks (Reisman, 2012; Seixas, 2017; van Drie & van Boxtel, 2008; Wineburg, 2001). Wilson et al. (2023), reviewing school-based historical-literacy interventions, similarly found stronger results where a specific disciplinary skill was clearly targeted.

For Grade 8 History of Uzbekistan, the problem is therefore not solved by adding group work, debate, or digital tools to otherwise conventional lessons. A competency-oriented lesson

needs internal alignment: the intended competency must shape the historical question, the evidence students handle, the activity they perform, and the form of assessment used. This need also corresponds with Uzbekistan's regulatory direction. Resolution No. 157 of 27 March 2024 defines learning outcomes in competency terms and emphasizes learner-centeredness, assessment mechanisms, continuity, independent thinking, and attention to cultural and historical heritage. The six competency domains inherited from the earlier national framework are retained here as analytical categories, while the 2024 regulation is treated as the current normative basis for outcome-oriented standard development.

The study asks four questions: which theoretical and regulatory principles should structure such a system; how broad competencies can be expressed through historical-thinking practices; which learning methods can produce observable competency performances; and how assessment can document development without reducing achievement to recall. Because the article develops a conceptual model rather than reporting a classroom intervention, its claims concern coherence and applicability, not effectiveness.

2. Theoretical and Regulatory Framework

Competence has been defined differently across traditions, but major approaches share an emphasis on integrated performance. Raven (1984) associated competence with capabilities, motivation, values, and dispositions for effective action. Khutorskoy (2003) and Zimnyaya (2004) similarly linked key competencies to purposeful activity and educational outcomes rather than isolated knowledge. Later international frameworks make the same point in different language: learners should be able to mobilize what they know in changing and socially meaningful situations (Council of the European Union, 2018; OECD, 2019). This implies constructive alignment. If a curriculum expects critical information use or civic reasoning, students need tasks that actually require those performances and assessment that recognizes them.

The systems tradition in pedagogy provides a useful design logic for this alignment. Kuzmina emphasized the interdependence of goals, content, participants, processes, and outcomes; Bespalko (1989) treated pedagogical technology as purposeful instructional design; and Babansky (1977) stressed the optimal coordination of goals, content, methods, resources, and control. Applied to history teaching, these ideas suggest that a competency cannot simply be added as a label in a lesson plan. It must affect what students investigate, the sources they use, how the teacher scaffolds the task, what students produce, and how evidence of learning is collected.

Historical thinking gives the model its disciplinary substance. Wineburg (2001) described sourcing, contextualization, and corroboration as central to expert historical reading. Van Drie and van Boxtel (2008) included historical questions, sources, contextualization, concepts, and argumentation in their framework, while Seixas and Morton (2013) organized historical thinking around significance, evidence, continuity and change, cause and consequence, perspectives, and ethical dimensions. These are not proposed here as a separate seventh competency. Rather, they are the practices through which general competencies become observable in history. Communication is shown in evidence-based explanation and discussion; information competence in locating, comparing, and evaluating sources; civic competence in contextual analysis of institutions and public choices; cultural competence in interpretation of heritage and multiple perspectives; self-development in reflection and revision; and technological competence in the responsible use of digital sources, maps, timelines, and data.

The national policy context requires a distinction between the earlier competency classification and the present standard-setting procedure. Resolution No. 187 (2017) provided the

original basis for the six broad competency categories used in this model. Resolution No. 157 (2024) now governs the development and implementation of state educational standards, defining stage outcomes in competency terms and requiring attention to learner-centered approaches, cultural and historical heritage, assessment, and educational continuity. Since Grade 8 belongs to the basic secondary stage, these provisions support a classroom model that translates broad outcomes into demonstrable historical performance.

3. Method

The study uses a theoretical-conceptual design and pedagogical modeling. It draws on four bodies of material: foundational work on pedagogical systems and instructional design; literature on competence and competency-based education; research on historical thinking and historical literacy; and official Uzbek regulatory documents concerning state educational standards. No experiment, survey, classroom observation, or statistical comparison was undertaken.

Analysis proceeded by identifying recurring principles across these sources—outcome orientation, integration of knowledge and action, learner activity, alignment, feedback, reflection, and transfer—and then comparing the six broad competencies with discipline-specific practices of historical inquiry. The relationships were translated into observable student performances and feasible Grade 8 tasks. Finally, these elements were organized as a model connecting targets, content, instructional processes, and assessment. The criteria for inclusion were theoretical coherence, disciplinary authenticity, classroom teachability, assessability, and compatibility with learner-centered education. The resulting matrices are design tools, not validated measurement scales.

4. Proposed Methodological System

The model is built around four interdependent components. Their value lies less in the individual parts than in the requirement that they remain aligned. A strong outcome is stated as an action a student can perform with historical knowledge; content is chosen because it offers a meaningful basis for inquiry; process includes the teacher's scaffolding and the student's intellectual activity; and assessment gathers evidence of the same performance that the outcome names.

Table 1. Structural components of the methodological system

Component	Function	Typical elements	Evidence of implementation
Target/outcome	Defines what students should be able to do with historical knowledge.	Competency, historical-thinking performance, expected level.	Observable outcome, for example comparing two sources and justifying which is more useful.
Content	Selects material with disciplinary and competency potential.	Events, concepts, people, maps, data, primary and secondary sources, heritage materials.	Content supports inquiry, comparison, explanation, or contextual reflection rather than coverage alone.
Process/technology	Organizes teacher scaffolding and student activity.	Inquiry, source analysis, discussion, case analysis, projects, timelines, maps, digital resources.	Students produce explanations, arguments, comparisons, interpretations, or presentations.

Component	Function	Typical elements	Evidence of implementation
Assessment/reflection	Collects evidence and guides improvement.	Questioning, rubrics, self/peer assessment, short performance tasks, portfolios, reflection.	Feedback is linked to the competency indicator and identifies a next step.

Several principles guide the system. Outcomes should be few enough to remain teachable and assessable in a lesson or unit. Historical tasks must be disciplinary rather than merely active: students should interpret, compare, explain, justify, and revise. Scaffolding is gradually reduced as learners gain independence. Formative evidence is gathered during learning, not only at the end. Historical heritage and civic or cultural values are addressed through contextual, evidence-based interpretation rather than predetermined judgments. Technology is used when it improves access, visualization, comparison, collaboration, or feedback, and students are expected to consider the credibility and provenance of digital information.

Operationalization is essential because a broad competency label gives little practical guidance by itself. The following matrix links each domain to a history-specific performance and the type of evidence a teacher can reasonably observe.

Table 2. Operationalization of key competencies in Grade 8 history

Competency	History-specific performance	Example task	Observable evidence
Communicative	Explains claims clearly and responds to alternative interpretations using evidence.	Structured debate on causes or consequences of a reform.	Clear claim, relevant evidence, historical vocabulary, response to another view.
Information	Locates, compares, corroborates, and evaluates historical information.	Compare textbook, map, statistical table, image, and short primary-source extracts.	Identifies source type and provenance, agreement or contradiction, usefulness and limits.
Self-development	Plans learning, monitors understanding, revises interpretations, and reflects on progress.	Short learning journal after source inquiry.	Uses feedback, identifies uncertainty, revises a claim, names a useful strategy.
Socially active civic	Connects past institutions, rights, responsibilities, decisions, and consequences while respecting context.	Case analysis of a historical political or social decision.	Identifies stakeholders and consequences; avoids presentism; justifies interpretation with evidence.
National and general cultural	Interprets heritage, continuity and change, diversity, and wider historical connections.	Contextual analysis of an artifact, monument, text, or cultural practice.	Explains significance, recognizes perspectives, connects national heritage to broader processes.

Competency	History-specific performance	Example task	Observable evidence
Scientific and technological	Uses digital tools and data responsibly for historical inquiry and communication.	Create a sourced digital timeline or compare two online representations of an event.	Checks authorship and provenance, cites sources, separates evidence from unsupported claims.

5. Pedagogical Mechanisms

Source-based inquiry is central because it requires students to construct an answer from evidence rather than receive a completed narrative. A manageable Grade 8 task may use two to four short sources with different origins or perspectives. Prompts about authorship, date, audience, purpose, context, corroboration, and limitations make the reasoning process explicit. Document-based instruction has shown that historical thinking can develop alongside factual knowledge when such practices are sustained rather than treated as occasional enrichment (Reisman, 2012; Wilson et al., 2023).

Problem questions should require explanation, comparison, evaluation, or judgment. Asking why a reform affected groups differently, which source better supports a claim, or what changed and what remained continuous gives factual knowledge a purpose. Structured discussion works on the same principle. Students may be required to state a claim, use two pieces of evidence, address a counterargument, and revise their position after hearing another group. The interaction matters because of the reasoning it elicits, not because students are simply talking to one another.

Perspective taking and case analysis are particularly useful for civic and cultural competencies, provided that students first examine the constraints, information, norms, and possibilities available to historical actors. This helps reduce presentism. Timelines and maps can make chronology and spatial change more visible, while short projects can connect history with geography, literature, law, cultural studies, or digital literacy. Projects remain competency-oriented only when criteria for source quality, historical explanation, collaboration, and communication are explicit.

Reflection is necessary for self-development. Brief prompts asking which evidence altered an interpretation, where uncertainty remained, how disagreement was resolved, or where the same reasoning strategy could be used again make learning processes visible. A practical lesson cycle therefore moves from a central problem and essential background knowledge to evidence encounter, collaborative reasoning, individual synthesis, and feedback/reflection. Repetition of this structure can allow teacher prompts to be gradually withdrawn as students become more independent.

6. Assessment Framework

Competency-oriented assessment asks not only what a student knows but how well that knowledge is used. Factual knowledge remains indispensable: historical arguments are weak when they ignore chronology, context, or evidence. The difference is that knowledge is assessed together with reasoning and communication. Suitable evidence includes source-analysis notes, oral explanations, document-based questions, comparative charts, annotated maps or timelines, evidence-based paragraphs, structured debates, mini-projects, journals, and portfolios. The form should follow the stated outcome. Communicative competence, for example, cannot be inferred

adequately from a multiple-choice test, while information competence requires some evidence that a student can judge source provenance and usefulness.

For classroom purposes, performance can be described at four developmental levels—Emerging, Developing, Proficient, and Advanced—without treating the labels as fixed characteristics of a learner. Across tasks, teachers can consider five broad criteria: use of historical evidence, historical reasoning, communication, information evaluation, and reflection/transfer. At a proficient level, a student selects relevant evidence, explains a historical relationship with appropriate context, communicates a coherent conclusion, evaluates source features, and uses feedback to revise. Advanced performance involves weighing conflicting evidence, considering alternatives and uncertainty, responding to counterarguments, evaluating source limitations strategically, and transferring a reasoning strategy to a new problem.

Alignment is the practical rule. If an outcome says that students will evaluate two sources, the assessment must provide sources and require evaluation. If students are expected to participate in evidence-based discussion, criteria for oral reasoning and response to peers are needed. This prevents competency language from appearing in planning documents while final marks continue to depend almost entirely on recall.

7. Discussion, Practical Implications, and Limitations

The model addresses a gap between broad curriculum language and daily history teaching. General competencies become more rigorous when they are developed through the epistemic practices of a discipline rather than treated as content-free soft skills. Historical-thinking research supports explicit work with sourcing, contextualization, corroboration, explanation, and evidence-based argument (Reisman, 2012; Seixas, 2017; Wineburg, 2001). Pedagogical systems theory contributes a complementary point: goals, content, activity, resources, and assessment need to function as one design. This combination avoids both a content-only model centered on recall and an activity-centered model in which students are busy but the intended learning is unclear.

Interactive methods are therefore means, not ends. Debate is useful when evidence and counterargument are required; group work when roles and reasoning are structured around a historical problem; digital tools when they improve source access, visualization, verification, or communication. Wilson et al. (2023) found that historical-literacy interventions are more likely to be effective when a particular disciplinary skill is explicitly targeted and scaffolded. Method selection should follow the intended historical performance.

For unit planning, teachers need not assess all six competencies at once. A unit on political reforms might emphasize information and civic competence through source comparison and causal explanation. Cultural development may foreground cultural competence through significance and continuity/change. At lesson level, a stable inquiry routine can reduce procedural demands and give students more attention for reasoning. At school level, shared competency language, common rubrics, moderated student work, and curated sets of age-appropriate sources can improve consistency. Teacher professional learning is crucial because document selection, discussion facilitation, and the assessment of reasoning all require pedagogical content knowledge (Muchira et al., 2023).

The main limitation is that the study is conceptual. No Grade 8 students or teachers were sampled, so the model cannot be presented as an intervention of proven effectiveness. A second limitation is regulatory change: the six domains originate in the earlier framework, while future subject standards may reorganize competency outcomes under the 2024 procedures. The model should therefore remain adaptable. Empirical work could begin with expert review and classroom

piloting, followed by mixed-methods or quasi-experimental studies using measures of historical reasoning, source evaluation, communication, and self-regulated learning. Student work and classroom observations would be important for judging implementation, not just achievement scores.

8. Conclusion

A competency-oriented approach to Grade 8 History of Uzbekistan becomes workable when broad educational outcomes are translated into recognizable forms of historical performance. The proposed system connects target outcomes, historical content, instructional processes, and assessment/reflection, while using historical thinking as the disciplinary medium through which communication, information, civic, cultural, self-development, and technological competencies can be observed. Source work, explanation, argumentation, contextual interpretation, digital information use, and reflection are valuable because they generate evidence of what students can do with historical knowledge.

The framework is intended as a basis for lesson design and subsequent testing, not as proof of classroom impact. Its next step is empirical validation: determining whether the model is feasible for teachers, reliable for assessment, and effective in supporting students' historical thinking and broader competency development in actual Grade 8 classrooms.

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DEVELOPING STUDENTS' ENGLISH SPEAKING COMPETENCE THROUGH ARTIFICIAL INTELLIGENCE TECHNOLOGIES

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Abstract. *This article examines the development of students' English speaking competence through artificial intelligence technologies. It focuses on AI voice chatbots, automatic speech recognition, automated feedback, and adaptive speaking tasks. The article argues that AI is most effective when it is used as a supportive tool within teacher-guided, communicative, and ethically responsible instruction.*

Keywords: *artificial intelligence, speaking competence, English language teaching, AI chatbot, automatic speech recognition, feedback.*

INTRODUCTION

Developing English speaking competence is a central goal of modern foreign language education. Many students know grammatical rules and basic vocabulary, but they still have difficulty expressing ideas orally, pronouncing words clearly, participating in discussions, and responding spontaneously. These problems are especially common in EFL contexts where students have limited contact with authentic English outside the classroom. A further challenge is that teachers cannot provide long individual speaking practice and detailed feedback to every learner during one lesson. Artificial intelligence technologies offer new possibilities for overcoming these difficulties. Voice chatbots can simulate dialogue partners, automatic speech recognition can transcribe learner speech, and speech evaluation programs can provide feedback on pronunciation, fluency, rhythm, grammar, and vocabulary. Adaptive platforms can also adjust tasks to students' levels and learning goals. As a result, students can practise more often, receive immediate correction, and work on their weaknesses without fear of public mistakes.

However, AI should not be understood as a replacement for the teacher. Speaking competence includes not only pronunciation and fluency, but also discourse organization, sociolinguistic appropriateness, interactional strategies, and the ability to communicate meaningfully with other people. These aspects require human guidance, peer interaction, cultural awareness, and ethical assessment. Therefore, the purpose of this article is to analyze how AI technologies can support students' English speaking competence within a blended teaching model based on the IMRAD structure.

LITERATURE REVIEW AND METHODOLOGY

Recent literature on AI in education emphasizes a human-centered and pedagogically justified approach. UNESCO guidance documents stress that AI can support innovation in teaching and learning, but its use should protect privacy, inclusion, equity, and human agency. This is particularly important in speaking instruction because voice recordings may contain sensitive personal data. For this reason, teachers should choose reliable tools, explain the purpose of AI tasks, and avoid using automated scores as the only form of assessment. Studies on automatic speech recognition show that ASR can support pronunciation and speaking development by giving learners immediate and objective feedback. When students see that a system does not

recognize a word clearly, they begin to notice pronunciation problems and repeat the item more carefully. This noticing process is useful because learners often do not hear their own errors. ASR-based activities are especially helpful for individual practice, self-correction, and preparation before classroom speaking. AI voice chatbots also have strong pedagogical potential. They allow students to practise situational dialogues, interviews, role-plays, travel conversations, academic discussions, and professional communication. The advantage of a chatbot is that it gives each learner equal speaking time and creates a low-pressure environment. Students who are shy in class can first practise privately and then participate more confidently in peer or group interaction.

Automated speech evaluation programs can analyze pronunciation, stress, pauses, speech rate, and lexical range. Their feedback is not perfect, but it can serve as the first stage of correction. The teacher can then focus on deeper communicative aspects such as coherence, argumentation, relevance, pragmatics, and interaction. Thus, AI feedback and teacher feedback should be combined rather than opposed. The theoretical foundation of this article is based on communicative language teaching, task-based learning, sociocultural theory, and the interactionist view of second language acquisition. Speaking develops when learners use language for meaningful purposes, receive feedback, modify their output, and communicate with others. AI technologies can support these principles if tasks are carefully designed by the teacher.

Methodologically, the article uses qualitative analysis and pedagogical modeling. Recent studies on AI-supported speaking instruction were reviewed according to four criteria: the type of AI tool, the speaking sub-skill supported by the tool, the form of feedback, and the role of the teacher. On this basis, a practical model for university English classes was developed. The model may be applied during an eight-week module: students complete a diagnostic speaking task, practise with AI tools two or three times a week, collect feedback in a portfolio, and perform final speaking tasks assessed by a competence-based rubric.

Table 1. AI technologies and their pedagogical functions in speaking instruction

AI tool	Main function	Speaking outcome	Teacher role
Voice chatbot	Dialogue and role-play	Fluency and confidence	Select scenarios
ASR system	Transcription and error noticing	Pronunciation awareness	Explain errors
Speech evaluator	Automated feedback	Accuracy and rhythm	Validate scores
Adaptive platform	Personalized tasks	Autonomy and motivation	Differentiate learning

RESULTS AND DISCUSSION

The analysis indicates that AI technologies can improve English speaking competence in several interconnected directions. The first result is increased speaking practice time. In a traditional classroom, each learner may speak only for a short period, especially in large groups. With an AI chatbot or speaking platform, students can practise individually, repeat the same task several times, and compare their earlier and later versions. This repeated oral production is important for fluency because learners become faster and more confident in retrieving language.

The second result is improvement in pronunciation and intelligibility. ASR and speech evaluation tools can identify words or phrases that are unclear and can encourage students to repeat them. The system may not always be fully accurate, but it gives learners a signal that their

pronunciation needs attention. When this signal is followed by teacher explanation and targeted practice, students can improve stress, rhythm, final consonants, and connected speech.

The third result is reduction of speaking anxiety. Many students avoid speaking because they are afraid of making mistakes in front of others. AI provides a private and low-pressure space where learners can practise before public performance. This is not a substitute for real communication, but it is a useful preparatory stage. Students who first practise with AI often become more willing to speak in pairs, groups, and presentations.

The fourth result is the growth of learner autonomy. AI platforms can show transcripts, pronunciation indicators, vocabulary suggestions, speaking time, and progress data. When students learn to interpret this feedback, they become more responsible for their own improvement. A speaking portfolio can strengthen autonomy because learners collect evidence, write reflections, and set personal goals for the next task.

The fifth result is more differentiated instruction. Students in one group usually have different levels of vocabulary, grammar, pronunciation, and confidence. AI tools can offer easier tasks for weaker students and more complex tasks for advanced students. The teacher can also use common errors from AI practice to plan mini-lessons. In this way, AI helps the teacher make instruction more targeted and individualized. The following colorful scheme presents the proposed cycle. It begins with needs analysis, continues through AI practice and instant feedback, and finishes with correction, classroom interaction, and assessment. The cycle should be repeated throughout the module so that students gradually improve their speaking competence through practice, feedback, and reflection.

AI-Supported Model for English Speaking Competence

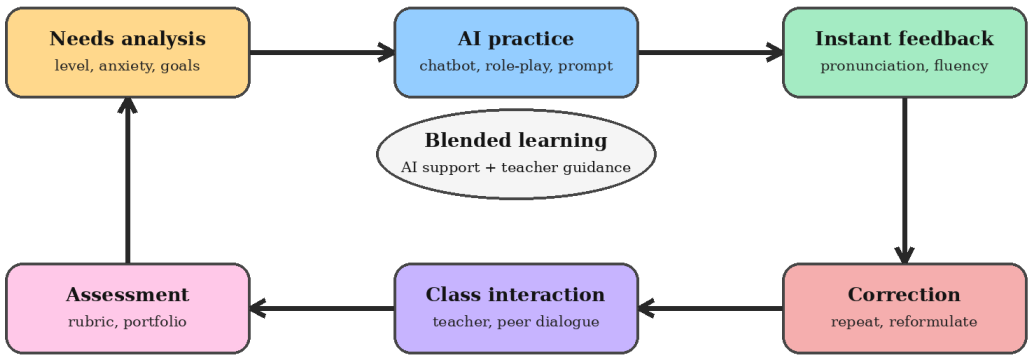


Figure 1. AI-supported cycle for developing English speaking competence

Despite these advantages, AI-supported speaking instruction has several limitations. Automated feedback may be inaccurate when students have strong accents, when the recording quality is low, or when background noise is present. Some systems may evaluate pronunciation mechanically and ignore the communicative value of the message. Therefore, AI scores should be treated as supportive evidence, not as final judgment. Human assessment remains necessary for meaning, coherence, pragmatics, and interaction. Another limitation is the risk of passive dependence on AI. If students only read or repeat ready-made answers produced by a chatbot, their own speaking competence will not develop sufficiently. To avoid this, tasks should require

students to speak first, analyze AI feedback, revise their own speech, and then perform the improved version in class. The main learning process is not receiving a perfect answer, but improving one's own oral output.

A practical classroom model may include three stages. In the pre-speaking stage, the teacher introduces the topic, vocabulary, pronunciation focus, and communicative goal. In the AI-speaking stage, students practise individually with a chatbot or ASR tool and save feedback. In the post-speaking stage, students use the improved language in pair work, group discussion, presentation, or debate. This structure connects technology with real communication. Assessment should be competence-based and balanced. A useful rubric may include pronunciation, fluency, grammatical accuracy, vocabulary range, coherence, and interactional strategies. AI tools can support assessment of pronunciation and fluency, while teachers and peers are needed for discourse, content, and social interaction. The final evaluation should combine AI evidence, teacher observation, peer feedback, and student reflection.

The pedagogical implication is that AI technologies are most effective when they are systematic, purposeful, and integrated with communicative tasks. Occasional use may motivate learners, but regular use within a clear methodology can produce deeper results. The strongest model is not AI instead of the teacher, but AI together with the teacher: technology provides practice and feedback, while the teacher provides meaning, ethics, and methodological direction.

CONCLUSION

Artificial intelligence technologies can make an important contribution to the development of students' English speaking competence. Voice chatbots, automatic speech recognition, automated speech evaluation, and adaptive platforms increase practice time, provide immediate feedback, reduce anxiety, support autonomy, and help teachers differentiate instruction. These opportunities are especially valuable in EFL contexts where students need more oral practice and more individualized correction.

At the same time, AI must be used responsibly. It cannot replace teacher judgment, peer interaction, cultural appropriateness, or ethical control. The most effective approach is a blended model in which AI-supported individual practice is followed by teacher-led communication and competence-based assessment. Future studies should examine long-term effects, data privacy, accessibility, and the reliability of automated feedback for learners with different accents.

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CORE AND DIGITAL COMPETENCIES TO BE ENHANCED IN FUTURE PHYSICIANS THROUGH THE TEACHING OF BIO-PHYSICS

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Abstract. *This study conceptualizes the core and digital competencies that should be enhanced in future physicians through digitally transformed biophysics instruction and illustrates how their development may be evaluated. The proposed framework synthesizes three interdependent layers: core competencies (critical and systems thinking, self-directed learning, motivation, interdisciplinary transfer, and communication); general digital competencies (information and data literacy, digital collaboration, content creation, safety, ethics, and problem solving); and biophysics-specific digital-professional competencies (digital modelling of biological processes, interpretation of measurements, understanding the physical basis of diagnostic technologies, and transfer of physical knowledge to clinical reasoning). A quasi-experimental pretest–posttest design is described for an experimental group of 60 students and a control group of 45 students. The intervention combines virtual laboratories, interactive simulations, clinically oriented biophysical cases, learning-management-system monitoring, adaptive independent tasks, electronic portfolios, peer review, and reflective reporting. For demonstration of the analysis procedure, an explicitly simulated dataset was constructed on a three-level rubric and converted to scores of 5, 4, and 3. Baseline differences were negligible (all $p \geq .896$). At posttest, experimental-group means exceeded control-group means across motivational-value, cognitive-biophysical, and operational-digital criteria (Welch $t = 3.31–3.91$; $p = .0013$ to $<.001$; Cohen $d = 0.65–0.77$). These illustrative findings support the internal logic of the framework but must not be interpreted as empirical outcomes. The article offers a transparent assessment model and practical guidance for integrating digital tools with clinical context in undergraduate medical biophysics.*

Keywords: *medical education; biophysics; digital competence; core competence; virtual laboratory; clinical reasoning; digital transformation; future physicians.*

Data transparency statement. *Numerical results in this paper are illustrative and simulated from the group sizes specified by the author. They demonstrate a plausible statistical analysis and must be replaced by verified participant-level observations before submission as an empirical study.*

1. INTRODUCTION

The digital transformation of health care has changed what medical graduates are expected to understand and do. Future physicians encounter electronic health records, diagnostic imaging, physiological sensors, telemedicine, clinical decision-support systems, and data-intensive research. Competent participation in this environment requires more than operational familiarity with devices. Students must judge the quality of information, interpret measurements, recognize model limitations, communicate responsibly in digital settings, and connect quantitative evidence

to patient-centred clinical reasoning. Consequently, digital competence in medical education should be treated as a professional capability rather than a separate computer-literacy topic.

Biophysics is strategically positioned to support this development. It explains the physical mechanisms underlying membrane transport, bioelectricity, haemodynamics, acoustics, thermoregulation, optics, ionizing radiation, and medical imaging. These concepts form a bridge between fundamental science and clinical practice. When the subject is taught mainly through static formulas and reproduction of definitions, however, students may fail to transfer physical principles to authentic clinical situations. Digital models and virtual experiments can make dynamic and invisible processes observable, allow variables to be manipulated safely, and provide immediate evidence for comparing a hypothesis with the behaviour of a system.

Digital tools do not improve learning automatically. Their effect depends on alignment among content, pedagogy, assessment, and the learner's developing capacity to use technology critically. The TPACK perspective emphasizes the integration of technological, pedagogical, and content knowledge [1], while DigComp 2.2 describes competence in information and data literacy, communication and collaboration, digital content creation, safety, and problem solving [2]. Multimedia learning and cognitive-load theory further indicate that visual and interactive resources require purposeful design; unnecessary information or poorly sequenced representations can overload working memory rather than support conceptual understanding [3,4]. In health professions education, technology-enhanced simulation is most effective when it is accompanied by clear objectives, feedback, opportunities for repeated practice, and meaningful assessment [5].

The dissertation materials on which this article is based identify a persistent gap between students' access to digital resources and their ability to interpret digitally generated biophysical evidence in a clinical context. Students may operate a simulation yet remain unable to explain why a parameter changes, identify sources of measurement error, or derive a clinically relevant conclusion. This is a "second-level" digital divide: the key difference lies not in access, but in the quality, independence, and professional relevance of use.

The purpose of this study is therefore to define an integrated system of core and digital competencies that can be enhanced through biophysics, translate that system into observable criteria and indicators, and demonstrate an appropriate quantitative evaluation strategy for a small quasi-experimental design. The research questions are: (1) Which competencies represent the distinctive contribution of digitally transformed biophysics to the preparation of future physicians? (2) Which teaching activities and digital tools can elicit those competencies? (3) How can change be assessed without reducing competence to a single test score?

2. CONCEPTUAL FRAMEWORK

Competence is understood here as an integrated capacity to mobilize knowledge, skills, values, judgment, and responsibility in a meaningful situation. Competency is not equivalent to possession of information: it is demonstrated when a learner selects and applies knowledge, evaluates the consequences of action, and reflects on the result. For medical students, this definition is especially important because a technically correct calculation has limited value if it is not interpreted in relation to physiological mechanisms, diagnostic uncertainty, safety, and patient care.

The proposed framework has three hierarchically connected layers. The first layer consists of core competencies: critical and systems thinking; self-directed inquiry; a stable motivational and value-based orientation toward learning; interdisciplinary integration; and evidence-based communication. Biophysics strengthens these capacities when students explain causal chains from

physical parameter to biological process and clinical manifestation. For example, connecting vessel radius, flow resistance, perfusion, and symptoms requires more than recall; it requires systems reasoning and disciplined interpretation.

The second layer comprises general digital competencies. Following DigComp 2.2, it includes information and data literacy, digital communication and collaboration, content creation, safety and ethical behaviour, and problem solving [2]. In biophysics, these areas become concrete when students locate a reliable dataset, use a virtual laboratory, construct and annotate a graph, share a protocol, protect sensitive information, distinguish a simulation from reality, and troubleshoot an implausible output. Digital safety also includes awareness that clinical or physiological data should not be copied into unapproved services and that algorithmic output requires human verification.

The third layer consists of biophysics-specific digital-professional competencies. These are the ability to model a biological process digitally; interpret biophysical and diagnostic measurements; explain the physical basis and limitations of medical technologies; operate within digital clinical environments; and transfer physical knowledge to clinical reasoning. Illustrative domains include diffusion and membrane potentials, pressure-flow relationships, ultrasound and Doppler measurement, optical systems, radiation attenuation, thermal exchange, and signal filtering. This layer constitutes the discipline's distinctive contribution: technology is used not as decoration, but as an epistemic instrument for observing, testing, measuring, and explaining.

The layers are mutually dependent. Core reasoning and responsibility guide the use of digital tools; digital literacy enables students to access and manipulate representations; discipline-specific competence gives those operations clinical and scientific meaning. The framework thus avoids two common reductions: treating digital competence as generic software skills, and treating biophysics competence as the reproduction of equations. It also aligns learning outcomes with observable performance and enables assessment through multiple sources rather than one examination.

Table 1. Three-layer competency system for digitally transformed medical biophysics

Layer	Components	Evidence in a biophysics task
Core	Critical/systems thinking; self-directed learning; motivation; interdisciplinary transfer; communication	Explains a causal chain, justifies a claim, seeks evidence, and communicates a clinically relevant conclusion
General digital	Information/data literacy; collaboration; content creation; safety/ethics; problem solving	Uses an LMS or simulation, processes data, creates a graph, collaborates responsibly, and resolves errors
Biophysics-specific digital-professional	Modelling; measurement interpretation; device principles; clinical digital context; knowledge transfer	Changes model parameters, evaluates limitations, interprets diagnostic output, and links physics to a clinical case

3. MATERIALS AND METHODS

Design and participants. A quasi-experimental pretest–posttest design was specified with an experimental group (n = 60) and a control group (n = 45). The unequal group sizes were retained in the analysis, and Welch's independent-samples t-test was selected because it does not require equal variances. The experimental group followed a digitally integrated method; the control group followed the established programme with conventional explanations, laboratory demonstrations,

textbook exercises, and routine assessment. For an actual implementation, allocation procedure, academic year, course level, demographic characteristics, inclusion criteria, institutional permission, and informed-consent arrangements must be reported. These details were not available in the supplied material and were therefore not invented.

Intervention. The instructional sequence consisted of six connected phases: initial diagnosis; selection of an appropriate learning trajectory; guided and independent digital study; creation of a digital product; reflection and peer review; and electronic-portfolio defence. The learning environment combined virtual laboratories, interactive simulation, clinically oriented biophysical cases, short multimedia explanations, LMS-based monitoring, adaptive independent assignments, electronic tests, and structured feedback. Students were expected to vary parameters, record observations, visualize data, compare model output with theoretical expectations, identify error sources, and formulate a clinical-biophysical conclusion.

Two complementary methodological routines organized the intervention. In the classroom and laboratory routine, a clinical-physical problem was followed by prediction, virtual experimentation, graph construction, and a defended conclusion. In the independent-learning routine, students set a goal, completed an adaptive task, created a digital artefact, received peer and teacher feedback, analysed errors, and documented improvement in an electronic portfolio. The teacher acted as a modelling mentor and discussion moderator during the first routine, and as a tutor and monitoring analyst during the second.

Assessment. Competence was evaluated through four evidence sources: a knowledge test; a virtual-laboratory protocol; a clinical-biophysical case; and a reflective portfolio entry. Three criteria were used. The motivational-value criterion reflected recognition of the medical relevance of biophysics, sustained engagement, and willingness to learn independently. The cognitive-biophysical criterion reflected conceptual knowledge, interpretation of equations and parameters, and explanation of clinical-physical relations. The operational-digital criterion reflected independent use of virtual laboratories, production and interpretation of graphs, application to clinical cases, and reflective error analysis. Performance was categorized as high (score 5), medium (score 4), or low (score 3). A real study should report rater training, inter-rater agreement, instrument reliability, and evidence of content validity.

Statistical strategy and simulation. Only group sizes were available for this manuscript; no participant-level observations were supplied. Therefore, plausible integer frequency distributions were constructed solely to demonstrate analysis. Counts were selected to reproduce the dissertation's reported pattern: near-equivalence at baseline and a marked shift from low to medium/high performance in the experimental group at posttest. Means and standard deviations were calculated after coding levels 5–4–3. Between-group differences were tested with Welch's t-test; categorical distributions were compared with Pearson's chi-square test; and standardized magnitude was summarized with Cohen's d. Two-sided $\alpha = .05$ was used. Because the values are simulated, p-values quantify internal separation in the constructed dataset, not evidence about a real population.

4. RESULTS

Baseline comparability. The illustrative pretest distribution was intentionally conservative. In the experimental group, high-level performance ranged from 8.3% to 8.3%, medium performance from 20.0% to 21.7%, and low performance from 70.0% to 71.7% across the three criteria. In the control group, the corresponding values were 8.9%, 20.0%–22.2%, and 68.9%–71.1%. Mean scores differed by no more than 0.02 points. Welch tests showed no baseline difference for

motivational-value and operational-digital performance, t = −0.09, p = .931, or for cognitive-biophysical performance, t = −0.13, p = .896. The distributions therefore provide a reasonable illustrative starting point for a quasi-experimental comparison.

Posttest distribution. Following the simulated intervention, the experimental group showed a consistent upward redistribution. For motivational-value competence, 23.3% reached the high level and 53.3% the medium level, leaving 23.3% at the low level. The control group showed 11.1%, 24.4%, and 64.4%, respectively. For cognitive-biophysical competence, the experimental distribution was 21.7% high, 51.7% medium, and 26.7% low; the control distribution was again 11.1%, 24.4%, and 64.4%. For operational-digital competence, the experimental distribution was 23.3% high, 48.3% medium, and 28.3% low, compared with 11.1%, 26.7%, and 62.2% in the control group.

Table 2. Illustrative pretest and posttest competency distributions, n (%)

Criterion	Time	Group	n	High	Medium	Low
Motivational-value	Pre	Experimental	60	5 (8.3)	12 (20.0)	43 (71.7)
Motivational-value	Pre	Control	45	4 (8.9)	9 (20.0)	32 (71.1)
Motivational-value	Post	Experimental	60	14 (23.3)	32 (53.3)	14 (23.3)
Motivational-value	Post	Control	45	5 (11.1)	11 (24.4)	29 (64.4)
Cognitive-biophysical	Pre	Experimental	60	5 (8.3)	13 (21.7)	42 (70.0)
Cognitive-biophysical	Pre	Control	45	4 (8.9)	10 (22.2)	31 (68.9)
Cognitive-biophysical	Post	Experimental	60	13 (21.7)	31 (51.7)	16 (26.7)
Cognitive-biophysical	Post	Control	45	5 (11.1)	11 (24.4)	29 (64.4)
Operational-digital	Pre	Experimental	60	5 (8.3)	12 (20.0)	43 (71.7)
Operational-digital	Pre	Control	45	4 (8.9)	9 (20.0)	32 (71.1)
Operational-digital	Post	Experimental	60	14 (23.3)	29 (48.3)	17 (28.3)
Operational-digital	Post	Control	45	5 (11.1)	12 (26.7)	28 (62.2)

Note. *High, medium, and low levels were coded as 5, 4, and 3 for mean-based analyses. All frequencies are simulated for methodological illustration.*

The largest descriptive shift occurred in motivational-value competence: the proportion at medium or high level reached 76.7% in the experimental group compared with 35.6% in the control group. The corresponding combined proportions were 73.3% versus 35.6% for cognitive-biophysical competence and 71.7% versus 37.8% for operational-digital competence. This pattern is educationally coherent: engagement may respond quickly to interactive and clinically meaningful activity, whereas independent digital performance and disciplined interpretation require repeated practice and feedback.

4. RESULTS (CONTINUED)

Mean-score analysis. At posttest, the experimental-group mean was 4.00 (SD = 0.69) for motivational-value competence, 3.95 (SD = 0.70) for cognitive-biophysical competence, and 3.95 (SD = 0.72) for operational-digital competence. Control-group means were 3.47 (SD = 0.69), 3.47 (SD = 0.69), and 3.49 (SD = 0.69), respectively. Thus, the illustrative between-group advantage ranged from 0.46 to 0.53 points on the three-point scoring interval.

Table 3. Illustrative between-group statistical comparisons

Criterion	Pre E	Pre C	p	Post E	Post C	Welch t	p	Co-hen d
Motivational-value	3.37	3.38	0.931	4.00	3.47	3.91	<.001	0.77
Cognitive-biophysi-cal	3.38	3.40	0.896	3.95	3.47	3.52	<.001	0.69
Operational-digital	3.37	3.38	0.931	3.95	3.49	3.31	0.001	0.65

Note. *E = experimental group; C = control group. Posttest degrees of freedom under Welch's method varied slightly by criterion. Data are simulated.*

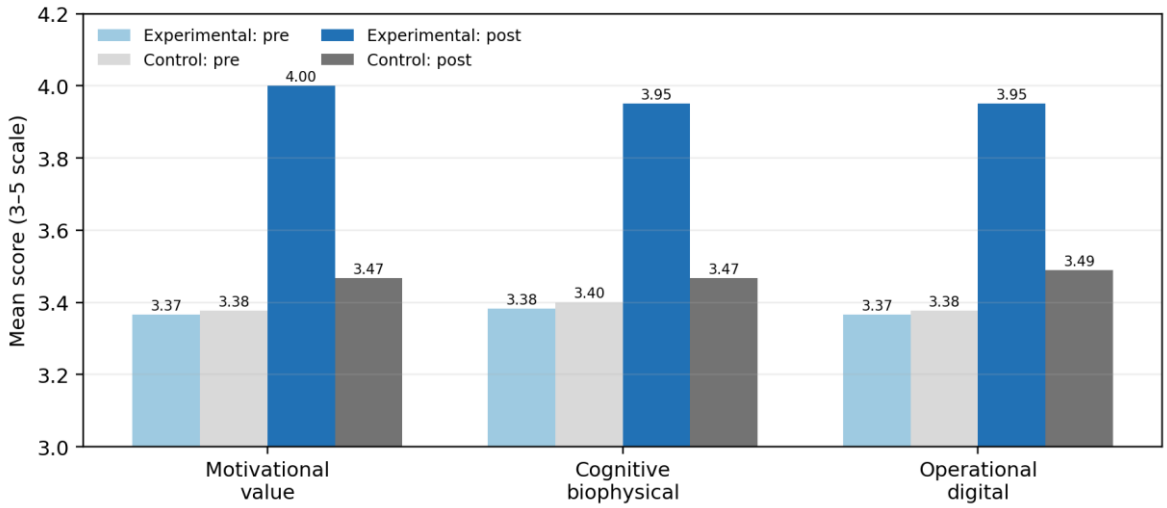


Figure 1. Mean criterion scores by group and measurement occasion (illustrative simulated data).

Inferential pattern. The motivational-value posttest difference was statistically separated in the constructed data, t = 3.91, p < .001, d = 0.77; the cognitive-biophysical difference was t = 3.52, p < .001, d = 0.69; and the operational-digital difference was t = 3.31, p = .001, d = 0.65. Pearson chi-square tests of the posttest level distributions yielded $\chi^2(2) = 17.98$, p < .001; $\chi^2(2) = 15.00$, p < .001; and $\chi^2(2) = 12.11$, p = .002, respectively. In conventional descriptive terms, the standardized mean differences are moderate to large. Again, this statistical coherence is a property of the simulated counts and should not be presented as confirmation of an actual intervention.

5. DISCUSSION

The proposed framework treats the teaching of biophysics as a setting in which general intellectual, digital, and profession-oriented capacities can develop together. Its main theoretical contribution is the separation of three levels without isolating them. Core competencies provide the reasoning and value basis; general digital competencies provide the means of accessing, processing, producing, and communicating information; and biophysics-specific digital-professional competencies ensure that these actions remain connected to measurement, mechanism, diagnostic technology, and clinical judgment.

This distinction is important because students may appear digitally fluent while using technology superficially. Rapid navigation, video consumption, or successful completion of a multiple-choice test does not demonstrate the ability to validate a model, question an anomalous result, or translate a signal into a physiological explanation. In the proposed method, competence be-

comes visible through performance: the student predicts, manipulates, records, visualizes, interprets, justifies, and reflects. Such activity is compatible with constructivist learning and with the TPACK principle that technology should be chosen in relation to disciplinary content and pedagogy rather than adopted as an independent add-on [1].

The illustrative results show how a multidimensional assessment can distinguish change in engagement, conceptual understanding, and digital action. The strongest simulated effect was motivational-value competence, which is plausible when abstract material becomes clinically meaningful and interactive. The cognitive and operational effects were slightly smaller but still substantial. Technology-enhanced simulation research has shown favourable outcomes for knowledge and skills, although effects vary with instructional design [5]. The present framework specifies several design mechanisms that could support learning: active manipulation, repeated practice, immediate feedback, gradual release of responsibility, clinical contextualization, and reflection.

There are direct implications for curriculum design. First, a virtual laboratory should be paired with a question that cannot be answered by merely clicking through the interface. Students should predict the direction of change, justify parameter selection, and compare observed and expected results. Second, every graph or table should culminate in a written clinical-biophysical interpretation. Third, LMS analytics should inform feedback and task differentiation, not function as a proxy for competence; login frequency alone does not prove learning. Fourth, electronic portfolios should contain evidence of revision and error correction, thereby making self-regulated learning visible. Fifth, digital ethics and safety should be embedded in routine tasks, including responsible data handling, attribution of sources, and explicit discussion of the limits of models and algorithmic outputs.

The model also offers an assessment advantage. A three-level rubric is understandable and feasible for routine use, but it should be strengthened before empirical application. Content experts should review item-to-competency alignment; raters should be trained with anchor examples; inter-rater reliability should be calculated for protocols, cases, and portfolios; and internal consistency should be reported where a multi-item scale is used. Where the same individuals complete pretest and posttest, analyses should account for pairing or use a mixed-effects/ANCOVA model that adjusts for baseline. Ordinal outcomes may also be analysed with proportional-odds models or robust non-parametric procedures.

Limitations. The numerical section is not an empirical report. It uses simulated aggregate counts requested for the article and cannot establish effectiveness, generalizability, causation, or precision in a real student population. No demographic covariates, missing-data patterns, fidelity measures, or validated scale characteristics were available. The article therefore functions as a conceptual and methodological prototype. Before journal submission as original research, every simulated value must be replaced with verified observations and the methods must be supplemented with setting, duration, allocation, ethics, instrument validation, and reproducible analysis details.

6. CONCLUSION AND PRACTICAL RECOMMENDATIONS

Digitally transformed biophysics can contribute to the preparation of future physicians when technology is used to investigate mechanisms, interpret measurements, and support clinically meaningful reasoning. The proposed competency system integrates core capacities, general digital competence, and biophysics-specific digital-professional performance. It provides a coherent line from intended outcome to learning activity and assessment evidence. The illustrative anal-

ysis demonstrates a transparent way to compare an experimental group of 60 students with a control group of 45 students, while also showing why simulated statistics must be labelled and later replaced by authentic observations.

For implementation, medical schools should: align every digital resource with a defined competency and clinical-biophysical problem; use virtual experiments that require prediction, parameter control, error analysis, and defended conclusions; combine classroom modelling with adaptive independent work and electronic portfolios; assess knowledge, performance, and reflection through a common rubric; embed digital safety and ethical judgment; and use validated instruments with appropriate statistical methods. This approach preserves the explanatory rigour of biophysics while making its relevance to contemporary clinical practice more visible.

The framework can guide future empirical studies across topics such as membrane potential, haemodynamics, ultrasound, optics, radiation physics, and thermal regulation. A sufficiently powered, ethically approved trial using participant-level data should test not only achievement but retention, transfer to clinical cases, self-regulation, and students' capacity to recognize the boundaries of digital models. Such evidence would clarify which instructional components produce durable professional competence and under what conditions.

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FORMATION OF FUTURE TEACHERS' PROFESSIONAL CULTURE THROUGH ARTISTIC-PEDAGOGICAL LITERATURE: AN ANALYSIS OF NATIONAL AND FOREIGN EXPERIENCE

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Abstract. *This article examines the theoretical and practical foundations of forming the professional culture of future teachers through the use of artistic-pedagogical literature, with a comparative analysis of national (Uzbekistan) and foreign experience. Professional culture is treated as an integrative quality of a future teacher that combines value orientations, pedagogical ethics, communicative competence, reflective ability, and creative-humanistic thinking, all of which can be cultivated through structured engagement with fiction, memoirs, and pedagogical essays devoted to teachers and schooling. Using theoretical methods — analysis and synthesis of scientific-pedagogical, psychological, and methodological literature, comparative-historical analysis, and generalization of pedagogical experience — the study reviews approaches developed in Uzbek pedagogy, including the humanistic legacy of Central Asian educational thought and contemporary normative documents on teacher training, alongside foreign models from Ukraine, Finland, Norway, and Turkey, where literary and narrative pedagogy is integrated into teacher education curricula. The results show that artistic-pedagogical literature performs several interconnected functions in professional formation: it develops empathy and ethical sensitivity, models reflective professional thinking, transmits value-laden images of the teacher's mission, and strengthens speech and communicative culture. The comparative analysis reveals both convergences — a shared reliance on reflection, discussion, and case-based reading — and divergences, particularly in the degree of institutionalization of literature-based courses and in assessment practices. The article concludes with a set of pedagogical recommendations for integrating artistic-pedagogical texts into the curricula of pedagogical higher education institutions of Uzbekistan, including the introduction of a structured reading-and-reflection component, literary circles, and portfolio-based assessment of professional-cultural growth. These findings may be useful for developers of teacher-education curricula, methodologists, and doctoral researchers studying the humanization of pedagogical training.*

Keywords: *professional culture; future teachers; artistic-pedagogical literature; teacher education; national experience; foreign experience; reflective practice; pedagogical ethics; teacher identity; literary pedagogy*

INTRODUCTION

The modernization of higher pedagogical education in Uzbekistan, intensified by the state programs for developing the higher education system and by the reforms outlined in national education legislation, places increasing emphasis not only on the subject-matter competence of future teachers but also on their professional culture — the integrative complex of values, ethical norms, communicative skills, and creative-humanistic orientations that determine the quality of a teacher's interaction with learners. While methodological and didactic training equips future teachers with

instructional techniques, professional culture is formed through a subtler and more prolonged process involving value internalization, emotional development, and reflective self-awareness.

Artistic-pedagogical literature — fiction, memoirs, essays, and narrative works devoted to teachers, schools, and the moral dilemmas of upbringing — has long been recognized as a resource for this kind of formation. Classic Uzbek and Central Asian didactic-literary traditions, together with the pedagogical legacy of authors who wrote about the teacher's mission, have historically served as a means of transmitting professional values to new generations of educators. In contemporary international scholarship, this idea is echoed in research on the use of fiction in teacher education, where reading and discussing literary texts is shown to support the construction of professional identity and the cultivation of empathy in preservice teachers.

The relevance of the present study is determined by a contradiction between, on one hand, the growing demand for teachers who possess not only technical skill but also moral-aesthetic sensitivity and reflective professional thinking, and, on the other hand, the still fragmentary and largely extracurricular status of artistic-pedagogical literature in the curricula of pedagogical higher education institutions of Uzbekistan. Whereas several foreign systems have begun to institutionalize literature-based approaches within teacher-education programs, the Uzbek experience in this area remains under-researched and insufficiently systematized.

The aim of this article is to analyze national and foreign experience of forming the professional culture of future teachers by means of artistic-pedagogical literature, to identify the pedagogical functions and mechanisms through which such literature contributes to professional-cultural development, and to formulate recommendations for its purposeful integration into the educational process of pedagogical higher education institutions of Uzbekistan.

The research addresses the following tasks: (1) to clarify the theoretical content of the concept "professional culture of a future teacher" and its structural components; (2) to characterize the pedagogical potential of artistic-pedagogical literature as a means of forming this culture; (3) to compare national and foreign experience of using literary texts in teacher training; and (4) to develop practical recommendations for Uzbek pedagogical higher education institutions.

MATERIALS AND METHODS

The study is theoretical-analytical in character and relies on a set of complementary methods. First, a systematic analysis and synthesis of scientific-pedagogical, psychological, and methodological sources was carried out, covering publications indexed in international databases (Scopus, Web of Science, DOAJ) as well as Uzbek and post-Soviet pedagogical literature devoted to the professional culture and professional competence of future teachers. Second, a comparative-historical method was applied to trace how the idea of using artistic and narrative texts in teacher formation has developed within Uzbek pedagogical thought and within several foreign educational systems (Ukraine, Finland, Norway, Turkey). Third, generalization and systematization of pedagogical experience were used to structure the reviewed material into functional categories describing how artistic-pedagogical literature influences the components of professional culture.

The corpus of analyzed sources included peer-reviewed journal articles on the formation of future teachers' professional culture and professional identity, studies on the use of fiction and multicultural literature in teacher education, national normative and legislative documents of the Republic of Uzbekistan concerning higher pedagogical education, and classic works of pedagogical and philosophical thought concerning the moral-aesthetic development of the individual. Sources were selected according to their direct relevance to the formation of teachers' professional-

personal qualities through literary or narrative means, and were analyzed using content analysis to identify recurring themes, mechanisms, and institutional practices.

For the purposes of this study, the professional culture of a future teacher is understood as a multicomponent construct comprising: (a) a value-motivational component (attitude toward the teaching profession, humanistic orientation); (b) a cognitive-reflective component (pedagogical thinking, capacity for self-analysis); (c) a communicative-speech component (culture of pedagogical communication, expressiveness); and (d) a creative-activity component (ability to apply knowledge creatively in non-standard pedagogical situations). Artistic-pedagogical literature was examined as a pedagogical means capable of influencing each of these components, whether through direct thematic content (works depicting teachers and schools) or through the broader humanizing effect of literary reading on empathy and ethical reasoning.

RESULTS

The analysis of national experience shows that the idea of forming a teacher's moral and professional qualities through literature and the word has deep roots in Central Asian and Uzbek pedagogical culture, which historically regarded eloquence, moral exemplarity, and familiarity with classical literary heritage as inseparable from the status of a mentor and educator. Contemporary Uzbek pedagogical research on the training of future teachers, including studies on the development of social-pedagogical competence and axiological education of students, consistently identifies value orientation, responsibility, and a well-formed "professional-cultural standpoint" as central goals of teacher preparation, and treats humanitarian and philological disciplines — including courses on speech culture — as an important channel for cultivating these qualities.

At the same time, the review indicates that in the majority of Uzbek pedagogical higher education institutions, artistic-pedagogical literature is used mainly within courses of literature-teaching methodology intended for future language and literature teachers, rather than as a cross-disciplinary tool for forming professional culture in all categories of future teachers. Literary analysis skills are cultivated primarily among future philologists, who are trained to conduct scholarly-philological and instructional-didactic analysis of literary works, while future teachers of other subjects encounter artistic-pedagogical texts, if at all, in a largely incidental and non-systematized manner.

The analysis of foreign experience reveals a more differentiated and, in several countries, more institutionalized picture. In Ukrainian pedagogical research, the professional culture of future teachers is treated as a distinct object of pedagogical technology design: scholars have proposed structured programs — described metaphorically as a "wheel of professionalism" — that combine reflective, motivational-value, and creative components, and have elaborated conceptual models for forming the foundations of professional culture within higher pedagogical education, emphasizing spiritual-creative and reflective-perceptive criteria alongside cognitive-instrumental ones (Halchenko et al., 2022; Halchenko et al., 2023). Related Ukrainian and Tatarstan research has examined the design of technologies for cultivating a future teacher's culture of intellectual work, underscoring those aspects of professional culture connected with self-organization and reflective learning (Mukhametshin et al., 2021).

In the Finnish and Nordic context, although literature-based pedagogy is not always isolated as a separate institutional track, teacher education is built on a strong research- and trust-based professional culture in which teachers are granted considerable autonomy and are expected to develop a reflective, narratively informed understanding of their own professional space; comparative studies of Finnish, Norwegian, and American teachers' professional experience emphasize

how personal narratives and stories are used as data and as pedagogical tools for understanding teacher agency and professional identity. In parallel, Nordic teacher-education research projects on the use of fiction — including multicultural novels read and discussed in structured, circle-like formats — demonstrate that engaging preservice teachers with literary texts set outside their own cultural experience measurably expands their capacity for empathy and for imagining the perspectives of future pupils from different backgrounds.

Turkish research on language teachers similarly shows that teachers' personal reading habits, perceived literary competence, and cultural orientation shape how they use literature as an instructional and identity-forming tool, and recommends that teacher-education programs deliberately cultivate reading habits and systematic literary competence rather than leaving them to individual initiative. Taken together with the philosophical argument — developed most influentially by Martha Nussbaum — that engagement with literature cultivates the capacity to imagine the situation of another person and thereby strengthens ethical sensitivity, these foreign sources converge on a common conclusion: artistic and narrative literature, when purposefully integrated into teacher education, functions as a distinct and effective instrument of professional-cultural formation, complementing rather than replacing methodological and subject-matter training.

A comparison of national and foreign experience reveals the following patterns. First, both traditions recognize the theoretical importance of literature and narrative for the moral-professional development of the teacher; the difference lies chiefly in the degree of curricular institutionalization. Second, foreign practice more often employs structured formats — literary circles, guided reflective writing, case-based discussion of literary works — whereas Uzbek practice relies more heavily on literature encountered within philological training or extracurricular reading, without a dedicated methodological framework connecting it to the formation of professional culture as such. Third, in both contexts, the effectiveness of literature-based approaches depends on the presence of guided reflection and discussion rather than on independent reading alone, confirming that it is the pedagogically organized encounter with the text — not the text in isolation — that produces professional-cultural growth.

DISCUSSION

The findings confirm that artistic-pedagogical literature can serve as an effective, though currently underused, resource for forming the professional culture of future teachers in the Uzbek higher education system. The comparative material suggests that the value of literature lies not merely in its thematic content — that is, in depicting teachers, schools, or moral dilemmas of upbringing — but in the reflective and dialogic practices that are built around it. This is consistent with Vygotsky's (1978) broader account of higher psychological functions developing through mediated, socially organized activity: literature becomes formative for professional culture when it is embedded in structured discussion, writing, and reflection, rather than consumed passively.

The Ukrainian model of describing professional culture through explicit criteria (reflective-perceptive, motivational-value, spiritual-creative, cognitive-instrumental) offers a useful framework that could be adapted to the Uzbek context, allowing methodologists to map specific literary activities onto specific components of professional culture. Likewise, the Nordic and Turkish evidence on the role of guided reading in cultivating empathy and cultural sensitivity suggests that Uzbek pedagogical higher education institutions could benefit from introducing multicultural and cross-cultural literary material, not only texts from the national canon, in order to prepare future teachers for increasingly diverse classroom environments.

At the same time, several limitations must be acknowledged. Because artistic-pedagogical literature affects the value-motivational and reflective domains of personality, its influence is difficult to measure with the same precision as subject-matter knowledge, and most of the reviewed foreign studies rely on qualitative, small-sample designs (interviews, reflective journals, case studies) rather than large-scale quantitative assessment. This is a methodological feature of the field as a whole rather than a flaw specific to any one study, but it means that recommendations formulated on this basis should be understood as pedagogically well-grounded rather than as statistically generalized conclusions. Furthermore, differences in language, literary canon, and cultural context mean that foreign models cannot be transplanted directly into the Uzbek system; they require adaptation to national values, the Uzbek literary heritage, and the specific structure of the state educational standards for pedagogical directions.

Another point of discussion concerns the balance between subject-specific and cross-disciplinary use of artistic-pedagogical literature. While it is natural that future philology and literature teachers receive the most intensive training in literary analysis, the reviewed foreign experience suggests that the formative power of literature for professional culture — empathy, ethical reasoning, reflective thinking, communicative culture — is relevant to future teachers of all specialties, including those in the natural and technical sciences. This points toward the pedagogical desirability of a modest, cross-disciplinary literary-reflective component within general pedagogical training, rather than restricting artistic-pedagogical literature to language-and-literature curricula alone.

CONCLUSION

The comparative analysis of national and foreign experience confirms that artistic-pedagogical literature possesses considerable, currently underutilized potential for forming the professional culture of future teachers. In the national context, this potential is supported by a rich Uzbek and Central Asian tradition that has historically linked eloquence, moral exemplarity, and literary erudition with the status of a teacher, as well as by contemporary research emphasizing value orientation and social-pedagogical competence in teacher training. In the foreign context, particularly in Ukraine, Finland, Norway, and Turkey, this potential is realized through more structured pedagogical technologies — reflective programs, literary circles, guided discussion of multicultural fiction — that explicitly connect literary engagement with defined components of professional culture.

On this basis, it is recommended that pedagogical higher education institutions of Uzbekistan: (1) introduce a compact, cross-disciplinary reading-and-reflection component within courses on pedagogy and pedagogical ethics, drawing on both national and world artistic-pedagogical literature; (2) organize literary circles and guided discussions in which future teachers of all specialties analyze depictions of teachers, schools, and moral dilemmas of upbringing and relate them to their own professional values; (3) develop methodological guidelines that map specific literary activities onto the value-motivational, cognitive-reflective, communicative-speech, and creative-activity components of professional culture, adapting the criteria-based approach developed in Ukrainian pedagogical research to Uzbek conditions; and (4) incorporate portfolio-based reflective writing about literary reading into the assessment of students' professional-cultural growth, alongside conventional academic assessment. Implementation of these measures may help align the training of future teachers in Uzbekistan more closely with international good practice while strengthening its foundation in national spiritual and literary heritage. Further empirical research, including pedagogical experiments with control and experimental groups, is needed to test the

effectiveness of the proposed recommendations in the specific conditions of Uzbek pedagogical higher education institutions.

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EFFECTIVENESS OF A METHODICAL SYSTEM FOR IMPROVING LESSON PERFORMANCE OF FUTURE PHYSICAL EDUCATION TEACHERS

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Abstract. *The effectiveness of a physical education lesson depends not only on a teacher's technical knowledge of exercises, but also on the ability to design the lesson, regulate physical load, ensure safety, manage communication, organize motor learning and reflect on results. This study experimentally evaluated a methodical system designed to improve the lesson performance of future physical education teachers. The pedagogical experiment was conducted during the 2023–2024, 2024–2025 and 2025–2026 academic years at Termiz State Pedagogical Institute and Andijan State Pedagogical Institute. The detailed experimental section included 468 students, equally divided into an experimental group (n=234) and a control group (n=234). The intervention integrated lesson design, microteaching, management of sport-game fragments, physical-load maps, safety checklists, video observation, expert assessment and reflective diaries into a single practice cycle. At baseline, the proportions of students at high and medium levels were 47.4% in the experimental group and 47.0% in the control group. At the final stage, this combined proportion reached 84.6% in the experimental group and 69.3% in the control group. The experimental group mean score was 2.19 compared with 1.93 in the control group; the effectiveness coefficient was K=1.132. Statistical analysis showed T=3.284>1.96, χ^2=11.876 and p=0.003. The findings confirm that a structured methodical system combining planning, practice, observation, feedback and reflection significantly improves future physical education teachers' readiness to conduct effective lessons.*

Keywords: *future physical education teachers, lesson effectiveness, methodical system, microteaching, physical load, safety, video observation, reflective assessment.*

INTRODUCTION

Contemporary physical education requires teachers to perform a complex professional role that extends far beyond demonstrating exercises. A high-quality lesson combines educational, health-promoting, developmental and social objectives, while simultaneously demanding effective class management, appropriate physical load, safety, inclusion and meaningful student participation. UNESCO's Quality Physical Education framework treats physical education as an educational field that should support inclusive participation, lifelong physical activity and personal responsibility rather than merely reproduce sport techniques [1]. WHO recommendations likewise emphasise the importance of regular physical activity for the physical and psychosocial development of children and adolescents [2].

These expectations increase the requirements placed on teacher education. Future physical education teachers need not only subject knowledge but also the ability to transform that knowledge into observable pedagogical action. Physical literacy research stresses motivation, confidence, competence and conscious engagement with movement [3]. In teacher preparation, this

perspective shifts attention from knowing what exercise to teach toward deciding why, when and how a particular task should be introduced, modified and assessed.

Classical and contemporary research in physical education pedagogy provides a strong theoretical basis for such a shift. Siedentop links teaching competence with lesson management, concise instruction, observation and timely correction [4]. Rink emphasises purposeful lesson objectives, progressive task development and active student participation [5]. Metzler demonstrates that different instructional models generate effectiveness through different mechanisms and therefore require conscious methodological selection [6]. Mosston and Ashworth show that teaching styles differ in the distribution of decisions between teacher and learner [7]. These approaches collectively indicate that effective teaching is a system of interrelated pedagogical decisions rather than a set of isolated techniques.

However, traditional preparation of future physical education teachers may leave a gap between theoretical knowledge and practical lesson management. A student can explain principles of physical load or lesson structure yet experience difficulty when required to manage a real group, correct movement errors, maintain density, prevent injury, communicate clearly and evaluate results under time pressure. Therefore, the core research problem is how to convert theoretical-methodical knowledge into stable professional action.

The study addressed this problem by developing a methodical system in which lesson design, microteaching, sport-game fragments, load monitoring, safety control, video observation, expert feedback and reflective analysis were linked in one continuous learning cycle. The purpose of the present article is to evaluate the experimental effectiveness of this system in improving the lesson performance of future physical education teachers.

MATERIALS AND METHODS

The pedagogical experiment was conducted during the 2023–2024, 2024–2025 and 2025–2026 academic years at Termiz State Pedagogical Institute and Andijan State Pedagogical Institute. The detailed experimental section comprised 468 students enrolled in physical culture teacher-education programmes. Participants were divided equally into an experimental group (EG, n=234) and a control group (CG, n=234).

The research followed three successive stages. The diagnostic stage assessed the initial level of lesson-performance readiness in both groups. The formative stage implemented the developed methodical system in the experimental group while the control group continued traditional preparation. The final stage repeated the diagnostic procedures and compared the distribution of high, medium and low levels between groups. Statistical analysis was then used to examine whether the observed differences could be attributed to more than random variation.

Lesson performance was assessed through five interrelated criteria: lesson design; physical load and safety management; pedagogical communication; motor-skill teaching; and reflective assessment. Evidence was collected through lesson plans, microteaching fragments, load maps, safety checklists, video observation, observation protocols, practical tasks, reflective diaries, portfolios and expert conclusions. The use of several sources allowed the same professional action to be examined from planning, implementation and reflection perspectives.

The formative intervention was organised as a repeated professional-practice cycle. First, students designed a lesson by specifying educational, health-promoting and developmental aims, task sequence, timing, physical load and safety conditions. Second, they conducted a microteaching or sport-game fragment and tested the clarity of instructions, demonstration, group organisa-

tion and load regulation. Third, video observation and expert feedback were used to identify excessive verbal control, unclear instructions, unsafe positioning, inefficient time use or insufficient differentiation. Fourth, students recorded conclusions in reflective diaries and revised the next lesson plan.

The methodical system therefore did not treat microteaching, observation or reflection as independent activities. They were linked as consecutive elements of one professional decision-making process: planning, implementation, observation, evaluation and redesign. This structure was intended to move students from external methodological instructions toward increasingly independent pedagogical judgement.

Table 1. Baseline and final distribution of lesson-performance levels

Group / stage	n	High	Medium	Low
EG baseline	234	33 (14.1%)	78 (33.3%)	123 (52.6%)
CG baseline	234	32 (13.7%)	78 (33.3%)	124 (53.0%)
EG final	234	81 (34.6%)	117 (50.0%)	36 (15.4%)
CG final	234	54 (23.1%)	108 (46.2%)	72 (30.8%)

At the diagnostic stage, the groups were highly similar. The combined share of high and medium levels was 47.4% in the experimental group and 47.0% in the control group, while more than half of the participants in each group were at the low level. This baseline distribution indicated a common methodological need in lesson planning, physical-load regulation and post-lesson reflection.

RESULTS

The final diagnostics demonstrated a clear divergence between the groups. In the experimental group, the proportion of students at the high level increased from 14.1% to 34.6%, and the medium level increased from 33.3% to 50.0%. Consequently, the combined high-and-medium proportion rose from 47.4% to 84.6%. At the same time, the low level decreased from 52.6% to 15.4%.

In the control group, positive dynamics were also observed, but they were smaller. The high level increased from 13.7% to 23.1%, the medium level from 33.3% to 46.2%, and the combined high-and-medium proportion reached 69.3%. The low level fell from 53.0% to 30.8%, remaining approximately twice as high as in the experimental group.

To obtain an integral comparison, high, medium and low levels were assigned weighted scores of 3, 2 and 1 respectively. The final average score of the experimental group was 2.19, while the control group reached 1.93. The effectiveness coefficient was K=1.132, indicating that the experimental result was 13.2% higher than the control result.

The statistical analysis supported the pedagogical interpretation. The calculated Student criterion was T=3.284, exceeding the critical reference value of 1.96. Pearson’s chi-square value was χ^2=11.876 with p=0.003. These indicators show that the final difference between the groups was statistically significant and that the positive dynamics observed in the experimental group were unlikely to be explained by random variation.

Table 2. Methodical and statistical summary of the experiment

Indicator	Result	Pedagogical interpretation
Baseline comparability	EG high+medium 47.4%; CG 47.0%	Conditions for an objective comparison were established
Development dynamics	EG high+medium increased to 84.6%	Integrated lesson design and microteaching produced stable improvement
Final mean score	EG 2.19; CG 1.93	Experimental preparation produced higher practical readiness
Statistical significance	T=3.284; χ^2=11.876; p=0.003	The final difference was statistically significant
Effectiveness coefficient	K=1.132	Experimental group result was 13.2% higher

The quantitative changes were consistent with qualitative observations. Students in the experimental group became more precise in formulating lesson aims, better justified exercise sequence and physical-load decisions, and demonstrated greater attention to safety before the beginning of an activity rather than reacting only after a problem emerged. Microteaching also improved the economy of instructions and increased the ability to move from explanation to active student practice.

Video observation played a specific role in professional self-correction. It enabled students to identify behaviours that were difficult to notice while conducting the lesson, including excessive talking, unclear positioning, insufficient visual monitoring of the group and delays in correcting errors. Reflective diaries then converted these observations into concrete decisions for the next lesson. As a result, reflection functioned not as a descriptive report but as a mechanism for professional redesign.

DISCUSSION

The results support the view that the professional effectiveness of a future physical education teacher should be understood as an integrative pedagogical quality. It includes the ability to connect the lesson objective with movement tasks, physical load, group management, safety, communication and evaluation. This understanding is consistent with the international literature in which effective physical education teaching is linked to management, instruction, observation, feedback and active participation rather than to technical demonstration alone [4–7].

The large decrease in the proportion of low-level students in the experimental group is particularly important. The intervention did not rely on additional theoretical lectures as its main mechanism. Instead, it repeatedly required students to transform theoretical knowledge into lesson plans, practical fragments and observable decisions. This corresponds to the activity-oriented logic of teacher education: professional competence becomes visible when knowledge is used to solve a real pedagogical task.

Microteaching was a central element because it reduced the complexity of the teaching situation without eliminating its professional demands. Students could practise one fragment, receive targeted expert feedback and repeat the task with corrections. Such a cycle creates a bridge

between university coursework and full-scale school practice. It also makes errors pedagogically useful, because they become material for analysis rather than simply grounds for evaluation.

The load map and safety checklist strengthened another essential dimension of physical education teaching. Unlike many classroom subjects, physical education directly involves movement intensity, equipment, spatial organisation and injury risk. Therefore, instructional quality cannot be separated from load regulation and safety. The improved results suggest that these elements should be taught not as supplementary rules but as components of lesson design itself.

The role of video observation and reflective diaries is equally significant. Reflection in this study was tied to observable evidence. Students compared their intended plan with actual teacher behaviour and learner activity, identified discrepancies and formulated the next methodological decision. This mechanism is compatible with the broader understanding of reflective practice as the ability to analyse professional action and reconstruct it on the basis of evidence.

The findings also support the value of instructional diversity described by Metzler and Mosston and Ashworth [6,7]. An effective teacher must be able to choose among direct instruction, group work, sport-game organisation, partner tasks and independent activity depending on the lesson objective. Methodological flexibility is therefore not the absence of structure; it is the ability to select a structure deliberately.

Several limitations should be considered. First, the experiment was conducted in two pedagogical institutions, so transferability to other institutional contexts should be tested separately. Second, part of the evaluation depended on expert judgement and reflective evidence, which may introduce evaluator or self-report effects despite the use of multiple sources. Third, the available abstract reports final level distributions and general statistical indicators rather than criterion-specific effect sizes. Future studies should therefore provide separate quantitative dynamics for lesson design, load and safety, communication, motor-skill teaching and reflection.

CONCLUSION

The experimental results confirm the effectiveness of the developed methodical system for improving the lesson performance of future physical education teachers. The system integrated lesson design, microteaching, sport-game fragments, physical-load monitoring, safety checklists, video observation, expert feedback and reflective diaries into a single professional-practice cycle.

At baseline, the experimental and control groups showed almost identical combined high-and-medium level proportions (47.4% and 47.0%). By the final stage, the experimental group reached 84.6%, compared with 69.3% in the control group. The low level in the experimental group decreased from 52.6% to 15.4%. The final mean scores were 2.19 and 1.93 respectively, with K=1.132. Statistical analysis ($T=3.284$; $\chi^2=11.876$; $p=0.003$) confirmed the reliability of the final difference.

The pedagogical implication is that effective preparation of physical education teachers should not separate planning, practical teaching, observation and reflection. These processes must operate as one continuous cycle in which every lesson becomes both a teaching task and a source of evidence for the next professional decision.

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CONCEPTUAL, PEDAGOGICAL, AND ECONOMIC EFFICIENCY OF DIGITAL IDENTIFICATION TECHNOLOGIES IN HIGHER AND SCHOOL EDUCATION: AN ANALYSIS

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Abstract. *This article analyzes the conceptual, pedagogical, and economic foundations for implementing digital identification technologies (Face-ID, RFID, and AI proctoring) in school and higher education systems. The study establishes the relevance of implementing the tasks set out in Presidential Decree No. PF-73 of the Republic of Uzbekistan, particularly the need to eliminate digital and methodological gaps between higher and school education. As a logical continuation of the author's previous research, and drawing on the experience of Japan's Society 5.0 and Smart Campus models, the article examines contemporary requirements for educators, the economic efficiency of integrating these technologies into the educational process, and their potential to improve educational quality.*

Keywords: *digital identification, Face-ID, Society 5.0, Smart Campus, pedagogical competence, economic efficiency, academic integrity, HEMIS, LMS, cognitive monitoring*

Introduction

In the 21st century, the Industry 4.0 paradigm and Japan's Society 5.0 ("super-smart society") concept require higher and secondary education institutions to ensure seamless integration between people and digital technologies. In education, digital identification is not merely a tool for monitoring attendance or security; it is a fundamental mechanism for ensuring academic transparency, personalizing the educational process, and elevating pedagogical interaction between teachers and learners to a qualitatively new level.

The implementation of the tasks set out in Presidential Decree No. PF-73 of April 28, 2025, "On Measures to Further Improve the System of Teacher Training," including the transformation of the education system, the broad introduction of digital technologies, and the assurance of continuity across levels of education, determines the fundamental relevance and practical significance of this article (President of the Republic of Uzbekistan, 2025). These priorities are also consistent with the national concept for developing the higher education system through 2030 (President of the Republic of Uzbekistan, 2019).

At present, significant infrastructural and methodological gaps remain between local higher education and school systems. Because an integrated digital ecosystem has not yet been established across all levels of education, a graduate who has acquired modern digital competencies in a Smart University environment may encounter serious pedagogical and technological contradictions when beginning work in a traditional school or another educational institution in the graduate's permanent place of residence. As a result, a graduate with strong digital competence may appear "insufficiently competent" in a traditional teaching environment, while graduates who achieved high academic results under traditional conditions may experience difficulties adapting to smart schools and contemporary digital environments. This process may adversely affect the

pedagogical and innovative image of higher education institutions and the perceived quality of teacher preparation.

The use of digital identification and unified digital ecosystem technologies in education, particularly within Smart Campus and Smart School initiatives at Japanese universities and schools, is regarded as an important factor in addressing these gaps and supporting academic integrity.

To examine these issues, studies by foreign and local scholars on digital identification and the modeling of digital learning environments were reviewed. Tanaka and Sato (2020) examined the use of biometric and RFID identification within Japanese Smart Campus projects and highlighted its potential to improve security and time management in educational environments. Using Kosen institutions as an example, Miyoshi (2021) described the potential of integrating digital identification and AI proctoring to strengthen learners' responsibility for independent study. Jain and Nandakumar (2016) discussed the role of biometric identification systems in information security and pedagogical diagnostics. Zimnyaya (2004) identified psychological and pedagogical factors involved in organizing the educational process on the basis of subject-to-subject relationships.

Among local scholars, Mamarajabov (2020) investigated the pedagogical and didactic foundations of digitalizing the educational process and developing the information and communication competencies of prospective teachers. In the authors' previous work, a mechanism and software solution were developed for the systematic assessment of students' independent and project-based activity through digital identification and cognitive-monitoring technologies (Mamarajabov & Normurodov, 2024).

The present article is a logical and continuous extension of the previous research. It considers the concept of digital identification not only in higher education but also within the school education system. It also analyzes contemporary pedagogical requirements for subject teachers, the experience of Japan's Smart Campus and Society 5.0 models, and opportunities to comprehensively improve organizational and economic efficiency through the modern digital infrastructure introduced on the university's new campus.

Under current conditions, the digitalization of education requires subject teachers to develop entirely new pedagogical and engineering competencies in addition to the traditional role of transmitting knowledge through lectures. A teacher with contemporary competencies is expected to:

- be as free as possible from routine organizational tasks such as taking attendance and completing class registers, allowing pedagogical attention to focus on metadisciplinary, project-based, and facilitative approaches to instruction;
- use analytical data provided by artificial intelligence and biometric identification tools to assess learners' knowledge, skills, and competencies objectively and transparently;
- analyze each learner's progress using real statistical data transmitted through identification systems to electronic journals and LMS/HEMIS platforms; and
- determine individual learning trajectories on the basis of the resulting data, ensure their vertical continuity, and apply these approaches effectively in pedagogical practice.

Thus, integrating digital identification technologies into the education system serves as an important pedagogical and technological mechanism for optimizing teachers' organizational workload, monitoring learners' activities, ensuring transparency in assessment, and forming individual learning trajectories.

Comparative Analysis of Japanese Experience and Local Practice

Although electronic journals, HEMIS, and LMS platforms have been introduced in Uzbekistan's school and higher education systems, subjective factors and time losses remain when attendance data are entered manually using analog procedures. To identify solutions to these problems, three main areas of digital identification technology use were examined in the experience of Tokyo and Kyoto universities and higher technical colleges (Kosen):

1. **Face-ID and biometric identification.** These technologies enable learners to be identified automatically within 1-2 seconds as they enter or leave classrooms and lecture rooms.
2. **IC cards (Smart Student ID).** These cards function as a unified digital identifier for access to libraries, laboratory equipment, and various social services.
3. **AI proctoring.** This approach enables continuous identification and monitoring of a learner during independent assignments and online assessment processes.

Table 1

Comparative Indicators of Digital Identification and the Traditional Monitoring Model

No.	Indicator and Criterion	Traditional Analog Model	Japan's Smart Campus/School Model	Impact on Education and Economics
1	Attendance recording time (30-80 people)	10-15 minutes	15-30 seconds (Face-ID / dynamic QR)	Can save up to 95% of instructional time
2	Academic transparency	Dependent on the human factor (subjective)	Up to 99.8% automated accuracy	Reduces the risk of falsification and subjectivity
3	Teacher labor expenditure	High level of routine paperwork	Oriented toward pedagogical and creative activity	Increases pedagogical efficiency
4	Data integration	Static (manual entry)	Dynamic (synchronized with LMS/HEMIS)	Enables the organization of cognitive monitoring

Note. Values and efficiency estimates are reproduced from the source manuscript.

Organizational and Economic Efficiency and the Quality Index

The introduction of digital identification systems in educational institutions can generate integrated pedagogical, organizational, and economic efficiency. The practical significance of these technologies is reflected primarily in optimizing teachers' working time, reducing administrative costs, and increasing transparency in educational quality.

Savings in pedagogical work time. The average 10 minutes spent recording attendance by traditional methods in each class can be reduced through automated digital identification tools. Depending on teaching load and the number of classes, this can allow up to 40-50 academic hours of instructional time per teacher each year to be redirected to pedagogical activity. Consequently, teachers can devote more time to lesson design, individualized work, consultation, and improving educational quality rather than routine attendance recording. At the institutional level, this contributes to substantial savings in labor-hour resources.

Resource optimization. The introduction of digital identification systems makes it possible to reduce paperwork and manually performed administrative monitoring. It also automates the monitoring of entry to and exit from educational buildings, the recording of library and laboratory resource use, and related oversight processes. As a result, material, technical, and human resources can be used more rationally and management costs can be optimized.

Improvement in educational quality and academic transparency. By reducing the influence of the human factor, digital identification systems can increase the objectivity of attendance and monitoring procedures. Depending on technological and organizational conditions, automated systems can substantially improve the level of academic transparency. Detecting and preventing falsified attendance, recording data in real time, and integrating those data into unified digital systems can strengthen learners' responsibility and discipline.

Thus, the organizational and economic efficiency of digital identification technologies is not limited to saving money or time. Rather, these technologies constitute an integrated digital mechanism that can improve an educational institution's overall quality index by redistributing pedagogical labor, optimizing management processes, promoting the rational use of resources, and improving academic quality monitoring.

Table 2

Efficiency and Quality Levels by Model (Percent)

Indicator	Traditional Model (%)	Digital Model (Japan) (%)
Academic Integrity	45	98
Classroom Time Efficiency	25	90
Cognitive Monitoring	35	85

Note. Percentages are reproduced from the source manuscript.

As shown in Table 2, the use of digital identification and Face-ID systems increases the reported level of academic integrity from 45% to 98%, classroom time efficiency from 25% to 90%, and the capacity for cognitive monitoring of learners' activity from 35% to 85%.

Conclusion

The experience of Japan's education system and local practice indicates that digital identification is not merely an administrative monitoring tool. It is also an important pedagogical and economic instrument for supporting the implementation of tasks established in education-related decisions and decrees and for strengthening continuity between higher and school education. Integrating digital identification technologies with platforms such as e-Maktab, HEMIS, and LMS can automate educational processes, increase academic transparency, and improve the efficiency of resource use. At the same time, developing teachers' digital-pedagogical competencies and ensuring the security of biometric data are essential conditions for the effective implementation of these systems.

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A TECHNOLOGY FOR THE FORMATION OF STUDENTS' INFORMATION COMPETENCE IN AN E-LEARNING ENVIRONMENT

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Abstract. *This article analyzes the theoretical and methodological foundations and technologies for developing students' information competence within the e-learning environment. It highlights the process of enhancing skills such as searching, selecting, analyzing, processing, and safely applying information through integrative educational software.*

The study proposes a pedagogical model based on interdisciplinary integration, a competency-based approach, reflective assessment, and adaptive learning principles. Based on international experience and empirical findings, the effectiveness of integrative software is substantiated, demonstrating its significance as a key tool for fostering students' critical thinking, creative activity, and digital culture.

Keywords. *information competence, e-learning environment, integrative educational software, digital technologies, competency-based approach, interdisciplinary integration, interactive methods, reflective assessment, adaptive learning, digital literacy, information security, critical thinking, creative activity, pedagogical model, STEAM approach.*

Introduction

In the context of the modern information society, one of the most important tasks facing the education system is the development of students' competence in effectively working with information. In an era of rapidly advancing digital technologies, learners must be formed not only as recipients of knowledge but also as independent individuals capable of searching, analyzing, processing, and consciously using information. Therefore, the modernization of the educational process, its organization based on a competency-based approach, and the effective use of e-learning environments are becoming pressing scientific and pedagogical issues.

At present, it is observed that traditional teaching methods do not fully ensure the development of students' information competence. This necessitates the introduction of an integrative approach into the educational process, strengthening interdisciplinary connections, and the use of interactive and digital tools. In particular, the 8th-grade level of general secondary education represents a critical stage in the development of students' logical and abstract thinking, making it essential to systematically develop information processing skills at this stage.

This study examines the development of students' information competence through integrative educational programs within the e-learning environment. The relevance of the research lies in its focus on integrating educational content, methods, and technologies into a unified system, thereby contributing to the development of students' critical thinking, independent learning abilities, and digital culture. Furthermore, the article analyzes methodological aspects of designing and

implementing integrative software based on international experience and modern pedagogical approaches.

Main Part

The development of students' information competence through educational software represents a complex scientific-pedagogical process aimed at the gradual formation and improvement of students' abilities to identify, search, select, critically analyze, process, safely use information, and generate new knowledge. This process is based on the integration of interdisciplinary content, digital technologies, interactive methods, and reflective assessment mechanisms within a unified didactic system.

This definition is grounded in the principles of integrativity (interdisciplinary synthesis), competency-based orientation (outcome-based capability), activity-based learning (problem-based and project-based instruction), reflexivity (self-monitoring), and adaptability (individual learning trajectories). The experience of developed countries demonstrates the theoretical and practical validity of this approach.

In the education system of the United States, the concept of 21st-century skills prioritizes the integrative development of critical thinking, problem-solving abilities, and digital literacy among students [1]. Through the STEAM approach, interdisciplinary project-based learning is implemented in schools, fostering the application of information in practical tasks. This experience indicates that for the effective development of information competence, knowledge must be integrated into real-life contexts.

In European countries, the DigComp 2.1 framework systematically defines information competence as a process of identifying, evaluating, managing, and creating information [2]. This model substantiates the necessity of integrative teaching of digital culture and information security starting from the school level. In European schools, integrative digital platforms support students' independent inquiry activities and incorporate reflective assessment tools.

In the education system of South Korea, the digital learning environment is integrated at the national level, where interactive platforms and artificial intelligence-based adaptive systems ensure individualized learning trajectories for students [3]. This experience highlights the importance of developing integrative educational software based on differentiated approaches.

In schools in Japan, within the framework of the "Society 5.0" concept, interdisciplinary problem-based tasks are introduced to prepare students for responsible and creative engagement in the information environment [4]. The Japanese experience demonstrates that information competence should be developed not only technologically but also in alignment with social and ethical responsibility.

These international experiences serve as a methodological foundation for developing and implementing integrative software for 8th-grade students in general secondary schools. The 8th-grade stage is characterized by the development of abstract thinking, creating favorable conditions for advancing higher-level information processing skills.

The content of integrative software should be constructed based on interdisciplinary problem situations, enriched with multimodal information (text, graphics, video, simulations), and supported by reflective control mechanisms.

From a methodological perspective, the development of integrative software requires the following sequential stages:

- **diagnostics** (identifying students' current level of information literacy);
- **design** (developing interdisciplinary integrated modules);

- **implementation** (application in an interactive environment);
- **monitoring and improvement** (statistical and reflective analysis of results).

This process ensures the logical consistency and evidence-based nature of education.

From a personal scientific perspective, three key factors should be prioritized in the development of integrative software for 8th-grade students: content depth (tasks should encourage analysis and synthesis), reflective management (students should evaluate their own learning activities), and the integration of information ethics and cybersecurity. Only under these conditions can information competence rise above the level of technical literacy and lead to the formation of a conscious and responsible information subject.

The development of students' information competence through integrative educational software represents a scientific-pedagogical system that prepares learners for independent, critical, and creative activity within the information space through the integration of educational content, methods, and technologies. The implementation of such a methodology at the 8th-grade level transforms education from a reproductive model into a competency-based and innovative model, ensuring the sustainable development of students' intellectual and social potential.

N.T. Orinbetov, while analyzing the improvement of professional competence based on an integrative approach, emphasizes that "the integrative teaching model ensures effectiveness through visual design of professional activity based on informational, systemic, and integrative approaches" [5]. In the context of integrative software for 8th grade, this implies the necessity of developing information processing skills through visual modeling of student activity, interactive tasks, and project-based assignments. A strength of Orinbetov's model lies in considering competence as a unity of motivational, cognitive, activity-based, and reflective components. However, since it is primarily developed for higher education, it requires enrichment with adaptive and differentiated mechanisms for application in general secondary education.

In the context of the modern educational paradigm, interpreting integrative educational software as a tool for developing students' information competence implies a transition from fragmented content to holistic learning and from reproductive knowledge acquisition to functional and practical application. In particular, analyzing the methodology for developing and implementing integrative software for 8th-grade students from the perspective of e-learning theory and methodology requires revealing the dialectical interconnection between the content, processual, technological, and outcome-based components of education.

In the global educational space, the priority of the competency-based approach—particularly within the framework of the **Incheon Declaration** adopted in 2015—has defined the need to improve mechanisms for assessing educational quality and to introduce objective instruments for evaluating learning outcomes by 2030. This approach involves the systematic integration of scientific and technological achievements into educational content and the development of multilevel monitoring mechanisms. Consequently, integrative software can be interpreted not only as a didactic tool but also as an instrument for managing educational quality.

In the Republic of Uzbekistan, strategic documents such as the Presidential Decree PF-5712 ("Concept for the Development of Public Education until 2030"), PF-6079 ("Digital Uzbekistan – 2030"), and PF-60 ("Development Strategy of New Uzbekistan") emphasize the modernization of the educational process based on digital technologies, the creation of integrated educational and scientific resources, and the gradual implementation of individualization principles in

education. These regulatory frameworks substantiate the social relevance, scientific-practical significance, and strategic importance of developing and implementing integrative educational software.

Within the empirical research, experimental work was conducted in three stages during 2020–2023. A total of 468 students participated in the study, including 236 in the experimental group and 232 in the control group. Four general secondary education institutions were involved.

According to statistical analysis, the formation of key competencies in the experimental groups increased by an average of 18–19%. In particular, the proportion of high-level results increased by 21%, while low-level indicators decreased by 14%. These dynamic changes confirm the effectiveness of integrative software in developing information competence.

The improvement in skills related to information searching, selection, and analysis was approximately 20%, while a 17% increase was observed in creative problem-solving abilities. These results indicate that the adaptive and interactive features of e-learning resources actively engage students in cognitive processes.

From a logical perspective, integrative software establishes a three-level mechanism for developing information competence:

1. systematization of knowledge through interdisciplinary connections;
2. practical application through interactive activities in a digital environment;
3. strengthening self-regulation skills through reflective assessment mechanisms.

This process ensures the transition of students from reproductive learning to productive and creative activity.

From an objective standpoint, it should be noted that the implementation of integrative software depends on factors such as the adequacy of technical infrastructure, the ICT competence of teachers, and the optimal distribution of academic workload. However, through phased implementation and the introduction of monitoring mechanisms, these limiting factors have been significantly reduced.

Integrative educational software represents a theoretically, methodologically, didactically, and technologically grounded effective tool for developing information competence among 8th-grade students. The empirical results, demonstrating an average increase of 18–19%, confirm the practical effectiveness of this methodology and justify its broader implementation in the general secondary education system.

A.A. Yarullov, having developed an integrative model for managing the educational environment, explains that “integrative management is aimed at restoring the integrity of the educational environment and eliminating the fragmentation of pedagogical influence” [6]. According to another statement, “the management of the educational environment is carried out through the systemic integration of goals, tools, and subjects” [7].

These views define the conceptual architecture of integrative software for 8th grade: program goals (development of information competence), tools (multimedia modules, testing systems, simulations), and subjects (student–teacher–parent) must function in an interconnected manner. While Yarullov’s approach is well-developed from a managerial perspective, it should be enriched with modern components such as information ethics and digital security.

Integrative educational software forms a new pedagogical paradigm that fundamentally differs from the traditional knowledge transmission model in developing students’ information competence. At the center of this paradigm lies not the reception of information, but the processes

of searching, selecting, analyzing, processing, evaluating, and applying it in practical activities. Thus, integrative programs interpret information competence not merely as a set of technical skills, but as a unified system of cognitive, methodological, communicative, and axiological components.

The first paradigm is the **competency-integrative paradigm**, which organizes the process of working with information based on interdisciplinary integration. In this approach, the content of informatics, language and literature, mathematics, natural sciences, and social sciences is presented in an interconnected manner. The learner understands information more deeply by applying it across different contexts rather than within a single subject. As a result, information competence acquires a systemic rather than a fragmented character. This paradigm involves presenting knowledge in integrated modules, analyzing it through problem-based situations, and evaluating outcomes reflectively.

The second paradigm is the **activity-oriented information paradigm**, where the learner is not a passive consumer of information but an active subject. Integrative educational software develops independent information search and processing skills through projects, research tasks, problem-based assignments, and interactive activities. Here, information competence manifests in practical activity: students compare data, analyze it, evaluate its reliability, and draw conclusions. This paradigm fosters independent thinking, critical approaches, and decision-making culture.

The third paradigm is the **digital-cultural paradigm**, which integrates information competence with digital literacy. Modern integrative programs are developed based on interactive platforms, multimedia tools, simulations, and modeling technologies. Students learn not only to find and process information but also to use it in accordance with ethical standards. Concepts such as information security, media culture, copyright, and social responsibility are integral components of this paradigm.

The fourth paradigm is the **reflective-analytical paradigm**, aimed at developing students' ability to analyze and evaluate their own informational activities. Through self-assessment tools, electronic tests, diagnostic instruments, and analytical tasks, students determine their level of knowledge and define their development strategies. This strengthens the internal motivational basis of information competence.

The fifth paradigm is the **innovative-creative paradigm**, which supports the transformation of information into new products. Through integrative programs, students create new information outputs such as presentations, digital projects, infographics, databases, or solutions to problem situations. This process elevates information competence from a reproductive to a productive and creative level.

Thus, integrative educational software establishes multifaceted pedagogical paradigms that foster the development of students' information competence. These paradigms are based on the organic integration of competency-based, activity-oriented, digital-cultural, reflective-analytical, and innovative-creative approaches. As a result, learners not only acquire information but also consciously manage it, critically analyze it, and effectively apply it in real-life contexts. This contributes to achieving the strategic goal of modern education—forming active, responsible, and independent individuals capable of functioning in a digital and information-driven society.

E.A. Ekjanova and E.V. Reznikova define integrated education as "the joint learning and collaborative development of students with diverse educational needs within a unified educational environment" [8]. According to them, "the development of cooperation and social interaction skills in an integrated environment is of primary importance" [8]. This idea justifies the inclusion of collaborative project tasks, discussion forums, and cooperative activities in integrative software

designed for 8th-grade students. However, these studies are mainly conducted within the context of traditional inclusive education, and the technological aspects of digital integration remain insufficiently explored.

The methodology for developing integrative educational software for 8th-grade students should include the following structural stages:

- **diagnostic stage** (identifying students' current level of information competence);
- **design stage** (developing a system of tasks based on interdisciplinary integration);
- **interactive stage** (implementing multimodal and adaptive learning modules);
- **reflective stage** (organizing self-assessment and monitoring mechanisms).

Such a model ensures the coherent development of components of information competence, including searching, analyzing, processing, evaluating, and presenting information.

The scientific views of the authors analyzed above highlight the theoretical foundations of the integrative approach and serve as a methodological basis for developing integrative software for 8th-grade students. Integrative programs, as tools for developing information competence, go beyond mere knowledge transmission and contribute to the formation of critical thinking, reflective evaluation, interdisciplinary analysis, and digital culture. Thus, integrative software emerges as an effective pedagogical mechanism for educating independent and conscious thinkers who meet the demands of an information society.

Conclusion

Based on the results of this study, it has been scientifically and empirically substantiated that integrative educational programs serve as an effective pedagogical tool for developing students' information competence. The educational process organized on the basis of an integrative approach contributes to the systematic formation of students' skills in searching, selecting, analyzing, processing, and applying information in practice.

The pedagogical model developed in the course of the study ensures the coherent integration of educational content, methods, and technologies, enabling the transformation of learners from passive recipients of knowledge into active subjects of information. Empirical findings demonstrate that the use of integrative educational software significantly enhances students' critical thinking, creative approach, and independent decision-making abilities.

Furthermore, the e-learning environment organized through integrative programs plays an important role in developing students' digital literacy, information culture, and knowledge of cybersecurity. The proposed methodology is scientifically grounded and holds practical significance for application within the general secondary education system, contributing to the improvement of educational quality and its development in accordance with modern requirements.

Overall, the implementation of integrative educational programs in the teaching process enables the comprehensive development of students' information competence and supports their formation as active, independent, and responsible individuals in the context of a digital society.

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FROM DIGITAL VISIBILITY TO INSTITUTIONAL TRUST: TEACHER PRESTIGE IN UZBEKISTAN

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Abstract. *Digital communication has widened the public space in which teachers are observed and judged, but visibility by itself does not create professional prestige. This conceptual article examines how digital communication may reinforce or weaken teacher prestige in Uzbekistan by linking an information-communication strategy from Kamalov's doctoral work to research on professional identity, relational trust, school-family-community partnership, professional capital, and digital governance. Published TALIS 2024 data are used only to establish national context. Among lower-secondary teachers in Uzbekistan, 87% report that teachers are valued in society, 62% report using artificial intelligence in their work, 82% are satisfied with their terms of employment excluding salary, and 74% are satisfied with salary; the corresponding OECD averages reported in the country note are 22%, 36%, 68%, and 39%. The article develops a four-part mechanism in which substantive professional practice is represented transparently, interpreted through dialogue, and converted through repeated credible interaction into social recognition. Institutional credibility is the connecting condition. The analysis also identifies vulnerabilities specific to digital communication, including audience collapse, privacy breaches, attention-driven metrics, workload expansion, and unreviewed AI-generated communication. It concludes that digital professionalism should be governed as a collective institutional practice rather than treated as individual self-promotion, with implications for school communication policy, teacher development, parent engagement, and cooperation with mahalla and other community institutions.*

Keywords: *teacher prestige; digital communication; public trust; professional identity; school-community relations; artificial intelligence; TALIS; Uzbekistan*

1. Introduction

Digital media have changed more than the speed of school communication. They have changed the conditions under which professional work becomes visible. Parents and community members may now encounter a teacher through an official school channel, a messaging platform, a digital portfolio, a public comment, a news item, or an AI-assisted message as well as through face-to-face contact. These encounters are often brief and decontextualized. A carefully explained teaching practice can become more understandable to families, yet a single fragment of communication can also circulate without the context in which it was produced. In this environment, professional reputation is shaped partly by what teachers do and partly by how that work is represented and interpreted outside the classroom.

This distinction matters for teacher prestige. Visibility can make competence legible, but it can just as easily magnify conflict, reward performance without substance, or blur the boundary between a teacher's personal and professional roles. Kamalov's (2026) dissertation addresses this problem by placing information-communication activity within a broader social-pedagogical system that connects schools with families, mahalla institutions, the media, professional communities,

and public authorities. The underlying premise is not that greater publicity automatically raises prestige. Rather, communication becomes valuable when it helps stakeholders understand professional work, creates workable channels for dialogue, and situates recognition within credible institutional relationships.

Uzbekistan offers a distinctive setting in which to examine that relationship. The Organisation for Economic Co-operation and Development's (OECD) TALIS 2024 country note reports that 87% of lower-secondary teachers in Uzbekistan agree or strongly agree that teachers are valued in society, compared with an OECD average of 22%. The same note reports AI use by 62% of teachers, compared with 36% on average across OECD education systems, as well as relatively high satisfaction with employment conditions and salary (OECD, 2025b). These are teacher self-reports rather than direct measures of public trust, and they do not establish any causal link between technology and status. They do, however, show that digital professional practice is developing in a context where teachers report unusually high social valuation.

The central question of this article is therefore not whether teachers should become more visible online. It is how professional activity can be communicated in ways that remain credible when it moves into public and semi-public digital spaces. The article contributes a mechanism linking professional practice, transparent representation, dialogic interpretation, and social recognition, and then considers the institutional safeguards needed to keep that mechanism from becoming a form of reputation management detached from educational quality.

2. Teacher prestige in a digitally mediated public space

Prestige is related to, but distinct from, popularity. Hoyle (2001) distinguishes the comparative status of an occupation from the esteem attached to the qualities of its practitioners. Kamalov's (2026) social-pedagogical framework similarly treats teacher prestige as a compound social judgment grounded in professional competence, moral standing, trust, and recognition. Digital communication matters because it changes the evidence available to the people making that judgment. Lesson design, professional learning, community service, communication style, and responses to disagreement can all acquire an audience beyond the classroom.

Professional identity research helps explain why this expanded audience is consequential. Teachers construct and renegotiate professional identity through experience and interaction rather than simply carrying a fixed identity into each setting (Beijaard et al., 2004). Recognition can reinforce that identity when it is attached to meaningful expertise and legitimate professional contribution (Fuller et al., 2013). Digital settings complicate the process because audiences overlap. A message written for colleagues can be forwarded to parents; a classroom image can leave its original setting; a personal account can be read as an institutional statement. Digital professionalism therefore involves judgment about audience, role, evidence, and boundary, not only competence with a platform.

Relational trust provides a more precise account of how communication can affect prestige. Bryk and Schneider (2002) describe respect, competence, personal regard, and integrity as central dimensions of trust in schools. Each can be made more or less visible through communication. A clear explanation of an assessment decision may demonstrate competence and integrity; a timely and respectful response to a parent may show regard; an inaccurate or dismissive message may undermine both. The relevant outcome is not exposure itself but whether repeated encounters give stakeholders reasonable grounds to regard professional claims as credible.

The same logic appears in work on social capital and school-family-community partnership. Coleman (1988) emphasizes the importance of networks and shared norms, while Epstein et

al. (2018) show that durable partnership depends on organized structures rather than occasional contact. Jeynes (2007) likewise demonstrates the broader educational relevance of parental involvement. Digital platforms may reduce practical barriers to contact, but high message volume is not the same as strong partnership. Communication contributes to prestige when it improves intelligibility, reciprocity, and confidence in institutional procedures.

For the purposes of this article, institutional credibility refers to the stakeholder judgment that a school's professional claims, communication practices, and observed conduct are sufficiently consistent to warrant trust. This concept links individual professionalism to organizational practice. A teacher can communicate skillfully while working within an unclear or unresponsive institutional system, just as a school can publish polished content that is contradicted by everyday experience. Prestige becomes more stable when professional quality and institutional communication point in the same direction.

3. Analytical approach and evidence base

This is a theory-building conceptual article rather than an empirical test of causal relationships. Its primary source is Kamalov's (2026) DSc dissertation manuscript, especially the sections dealing with information-communication strategy, cooperation with families and mahalla bodies, media relations, digital platforms, professional image, transparency, and the pedagogical conditions associated with teacher prestige. Those passages were read for the functions assigned to communication in the wider model. Four recurring functions were retained for synthesis: making professional work visible and intelligible, enabling exchange, supporting recognition, and preventing reputational harm.

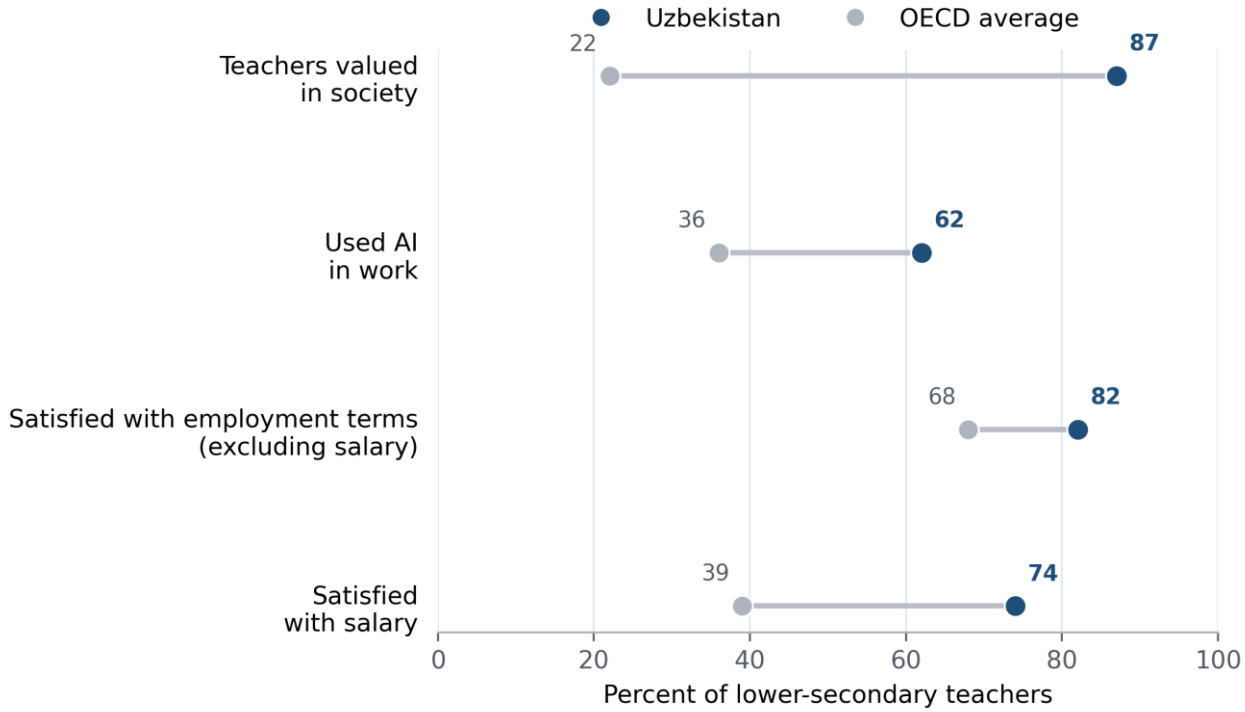
The grouping was interpretive rather than a formal content analysis with intercoder reliability or frequency-based claims. Its purpose was to clarify the causal logic implied by the dissertation and place it in dialogue with established research on professional identity, relational trust, professional capital, family-school-community partnership, teacher autonomy and well-being, and teacher status (Bryk & Schneider, 2002; Hargreaves & Fullan, 2012; International Labour Organization & United Nations Educational, Scientific and Cultural Organization, 1966; Skaalvik & Skaalvik, 2014; Vescio et al., 2008). Uzbek scholarship on pedagogical mastery, educational values, instructional design, cognitive pedagogy, and quality management provides additional conceptual grounding (Erkaboyeva, 2020; Ma'murov, 2017; Mardonov, 2006; Qurbonov & Seytxalilov, 2006; Safarova, 2024; Tolipov & Usmonboyeva, 2006).

A second source is the OECD's TALIS 2024 reporting for Uzbekistan and the broader TALIS 2024 report (OECD, 2025a, 2025b). Four indicators were selected because they describe the professional environment in which digital communication is occurring: teacher-perceived social value, use of AI in work, satisfaction with employment terms excluding salary, and satisfaction with salary. The statistics are contextual benchmarks only. TALIS is cross-sectional and based on self-report, and its Uzbekistan country note explicitly cautions that cross-country comparisons may reflect social and cultural context. The figures therefore should not be read as measures of public opinion or as evidence that digital communication causes prestige.

The analysis also treats Uzbekistan's Law on Education and Law on the Status of the Teacher as a normative boundary for digital professional practice, particularly where transparency intersects with rights, responsibilities, confidentiality, and professional autonomy (O'zbekiston Respublikasi, 2020, 2024).

Figure 1

Selected TALIS 2024 indicators for Uzbekistan and OECD averages



Note. Values are percentages of lower-secondary teachers. Source: OECD (2025b), Results from TALIS 2024: Country notes—Uzbekistan. The indicators are descriptive self-reports and are not presented as causal effects of digital communication.

4. Uzbekistan's digital-professional context

TALIS 2024 places the discussion in a context that is easy to misread if the indicators are collapsed into a single story. As shown in Figure 1, 87% of lower-secondary teachers in Uzbekistan report that teachers are valued in society, whereas the OECD average reported in the same country note is 22% (OECD, 2025b). This is a measure of teachers' perception of social value, not a survey of the general public. Even with that qualification, the result indicates that the profession is being experienced by many teachers within a comparatively favorable symbolic environment.

The technology indicator points to substantial, though not necessarily uniform, engagement with new tools. Sixty-two percent of teachers report having used AI in their work, compared with an OECD average of 36%. Among teachers who use AI, the country note reports frequent use for learning about or summarizing topics and for generating lesson plans or activities (OECD, 2025b). The important point for this article is not that AI use represents modernization by itself. It is that digitally mediated professional work is already common enough to make questions of authorship, accuracy, privacy, and institutional responsibility practical rather than hypothetical.

Employment indicators add another layer. Eighty-two percent of teachers report satisfaction with employment terms excluding salary, compared with 68% on average across the OECD systems reported in the note; 74% report satisfaction with salary, compared with 39% (OECD, 2025b). These measures should not be treated as a comprehensive diagnosis of working conditions, and they do not erase differences among schools or teachers. They do, however, caution against explaining professional status through dissatisfaction alone.

Taken together, the four indicators suggest a stewardship problem rather than a simple visibility problem. Where teachers already perceive substantial social value, a digital communication strategy does not need to manufacture status through constant promotion. Its more defensible task is to preserve and deepen credibility by making professional reasoning understandable, providing reliable channels for questions, and preventing communication practices from eroding professional boundaries. This interpretation also fits the wider international concern with sustaining the attractiveness and status of teaching while the profession adapts to changing technological conditions (United Nations Educational, Scientific and Cultural Organization & International Task Force on Teachers for Education 2030, 2024).

5. A mechanism from professional work to public trust

5.1. Professional practice as the evidentiary base

Prestige cannot be sustained by communication that has no substantive professional base. The starting point is therefore the work itself: sound lesson design, fair assessment, student support, professional learning, collegial contribution, community participation, and ethical conduct. Uzbek pedagogical scholarship has long treated mastery, values, reflective judgment, and instructional design as central to professional competence (Erkaboyeva, 2020; Ma’murov, 2017; Mardonov, 2006; Tolipov & Usmonboyeva, 2006). Digital communication is strongest when it reveals these practices selectively and accurately rather than replacing them with a curated image of professionalism.

5.2. Transparent representation as translation

Professional work is often difficult for people outside the classroom to observe directly. Representation is therefore necessary, but it should be understood as translation rather than exposure. Useful examples include explaining learning goals, summarizing a project, describing the reasoning behind an assessment procedure, documenting professional development, or reporting a community initiative. Such communication can make pedagogical choices more intelligible without turning classrooms into permanent public stages. Transparency is not the publication of everything that can be shared; it is the reduction of unnecessary opacity while protecting information that should remain private.

That distinction is especially important where students are involved. Images, assessment information, family circumstances, and records of conflict may be technically easy to distribute but professionally inappropriate to disclose. The Law on Education and the Law on the Status of the Teacher provide a legal and professional context in which openness must be balanced with rights, responsibilities, and protected boundaries (O‘zbekiston Respublikasi, 2020, 2024).

5.3. Dialogic interpretation

Representation alone cannot determine how an audience will interpret what it sees. Stakeholders need opportunities to ask questions, correct misunderstandings, and understand the procedures through which concerns are handled. This is where one-way publicity and trust-building diverge. Epstein et al. (2018) emphasize reciprocal structures in family and community partnership, while Bryk and Schneider (2002) show that trust depends on how respect and integrity are experienced in interaction. Digital communication contributes to trust when institutions specify who responds, within what time frame, and how a sensitive issue moves from a public channel into an appropriate private or formal process.

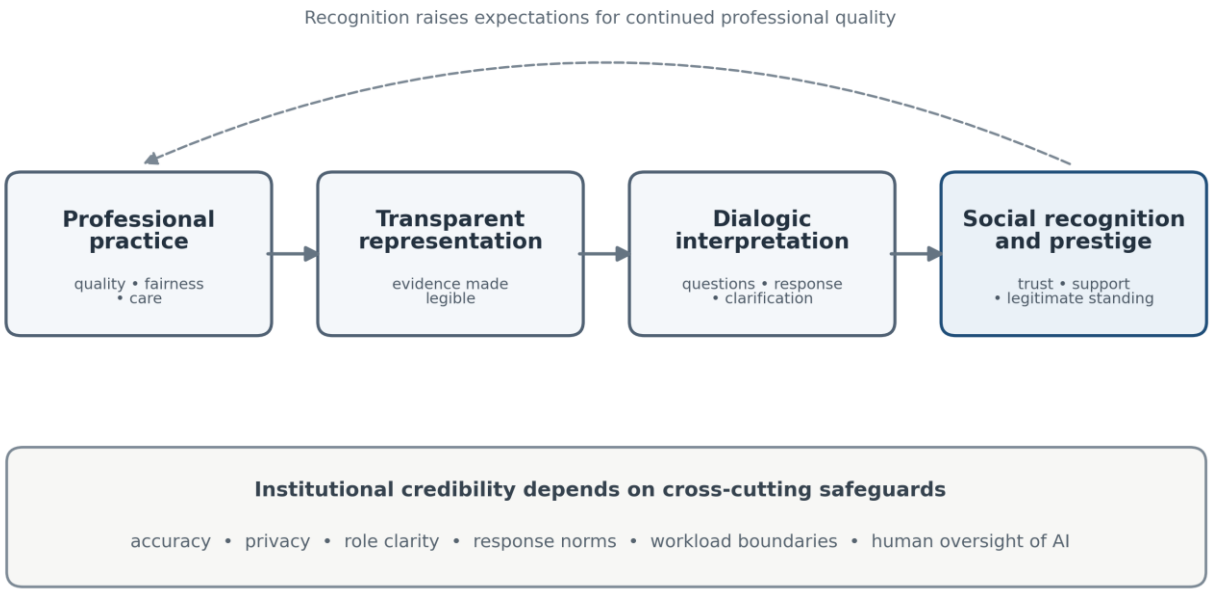
5.4. Social recognition and the feedback loop

Recognition is more durable when it follows repeated encounters with credible practice rather than a single act of promotion. It may take the form of parent confidence, community support, participation in school initiatives, professional awards, constructive media attention, or a willingness to respect legitimate professional boundaries. In the context of mahalla-based community life, recognition may also be reinforced through face-to-face relationships that give context to digital information. Recognition is not the endpoint of the process. Once teachers and schools are trusted, expectations rise; continued credibility then depends on maintaining the professional quality that produced recognition in the first place.

Figure 2 summarizes this mechanism. Institutional credibility is not a separate stage but a condition that must hold across the pathway. Accuracy, privacy, role clarity, response norms, workload boundaries, and human oversight of AI determine whether visibility is interpreted as trustworthy professional evidence or as mere publicity.

Figure 2

Proposed mechanism linking digital communication to teacher prestige



Note. Author synthesis based on Kamalov (2026), Bryk and Schneider (2002), and Epstein et al. (2018). The arrows indicate a conceptual mechanism to be tested empirically, not an established causal sequence.

6. Digital professionalism and reputational risk

Digital communication creates risks that are not entirely new but are intensified by scale, speed, and persistence. One is audience collapse: content prepared for one group can quickly reach another. Schools therefore benefit from a clear distinction between official institutional channels, professional accounts, and personal communication. The boundary will never be perfect, but role clarity reduces the chance that an informal statement is mistaken for an institutional position or that a teacher is expected to perform official communication through a private account.

Speed presents a related problem. Public criticism can circulate before facts have been checked, creating pressure for an immediate defensive response. A credible protocol places verification before argument. It acknowledges the concern, protects the people involved, identifies the appropriate channel for investigation, and provides factual updates when there is information that can responsibly be shared. This approach does not eliminate disagreement; it prevents speed from setting the standard of professional judgment.

Privacy is a more fundamental boundary. Student images, assessment records, family circumstances, and staff disputes should not enter public circulation merely because a platform makes sharing simple. The reputational cost of a privacy breach is not limited to negative publicity. It signals that visibility has been prioritized over the rights of students, families, or colleagues, directly weakening the integrity on which professional trust depends.

Attention metrics pose a different danger. Views, likes, reposts, and comments measure interaction with content, not confidence in a school or respect for a teacher. A communication strategy that optimizes for reach can therefore drift away from the goals of clarity and trust. Schools should evaluate communication by whether stakeholders understand important information, know how to seek clarification, and regard response procedures as fair—not by the amount of attention a post attracts.

Digital accessibility also has a workload cost. When every channel becomes a potential route to a teacher, responsiveness can gradually be redefined as permanent availability. That expectation conflicts with professional boundaries and may undermine well-being. Research on teacher autonomy and job satisfaction underscores the importance of working conditions that preserve professional agency (Skaalvik & Skaalvik, 2014). Institutions can protect that agency by setting response windows, designating official channels, and distributing communication responsibilities rather than allowing them to accumulate informally around individual teachers.

AI-generated communication requires an additional layer of oversight. Generative tools can assist with summaries, routine drafting, or translation, but fluent text can still be inaccurate, generic, or inappropriate to a local relationship. UNESCO’s guidance emphasizes human agency, privacy, governance, and human oversight in educational uses of generative AI (Miao & Holmes, 2023). For public-facing communication, responsibility remains with the teacher or institution that sends the message. AI may support drafting; it cannot carry accountability for accuracy, fairness, tone, or confidentiality.

7. Institutional strategy for schools and communities

A credible digital communication strategy begins with governance rather than content production. Schools need a shared understanding of what belongs on an official channel, which information requires consent or protection, who is authorized to respond to different kinds of questions, and how complaints move into formal resolution. These decisions reduce improvisation at moments when reputational pressure is highest. They also protect teachers from being individually responsible for institutional problems that require leadership or administrative action.

Professional development should therefore extend beyond platform skills. Teachers and school leaders need practice in audience awareness, concise public explanation of pedagogical decisions, privacy, media literacy, conflict de-escalation, and the review of AI-assisted text. The collective dimension matters. Hargreaves and Fullan (2012) describe professional capital as a resource built through shared professional capacity rather than isolated individual performance; the same principle applies to digital professionalism. Common norms are more protective than expecting each teacher to invent a personal communication policy.

Mahalla and other community institutions can help prevent digital communication from becoming detached from lived relationships. Meetings, joint educational projects, public recognition events, and structured consultation can place online information within a broader network of social contact. In Kamalov's (2026) model, media and digital platforms are part of an institutional ecology that also includes families, schools, community organizations, professional bodies, and the state. Treating the platform as one element of that ecology is more consistent with social trust than treating it as the primary site of reputation.

Evaluation should follow the same logic. Useful indicators include whether parents find school information clear, whether stakeholders know where to raise a concern, whether conflicts are resolved through established procedures, whether teachers experience communication demands as manageable, and whether public information accurately reflects professional practice. Teacher-perceived social value can be monitored as one outcome, but it should be interpreted alongside the quality of relationships and working conditions. Such measures are less spectacular than engagement counts, yet they are more closely aligned with the institutional credibility the strategy is meant to protect.

8. Discussion

The analysis reframes digital visibility as an input into teacher prestige rather than a result in itself. Digital media can make professional competence easier to see, but they also create more opportunities for work to be interpreted outside its original context. What matters is the credibility of the translation from practice to public representation. When representation is accurate, proportionate, and open to dialogue, it can reduce uncertainty around professional decisions. When it is promotional, unverified, or inconsistent with lived experience, the same visibility can weaken trust.

This framing shifts digital professionalism away from individual branding. A teacher's public communication is nested in school procedures, leadership decisions, family relationships, community norms, and legal responsibilities. The collective institutional setting therefore influences whether a teacher is protected by clear boundaries or exposed to inconsistent expectations. Kamalov's integration of family, mahalla, school, media, professional, and state institutions is useful precisely because it treats reputation as socially produced rather than individually manufactured.

The Uzbekistan case also illustrates why national indicators should be interpreted carefully. High teacher-reported social valuation and substantial AI use coexist in the same TALIS profile, but one does not explain the other. Nor do the figures show that public trust is uniformly strong. Their value is contextual: they suggest that digital communication is entering a professional environment where many teachers already perceive strong social recognition. In such a setting, the policy problem is as much about protecting credibility as it is about increasing visibility.

Several limitations follow from the design of this article. The proposed mechanism is conceptual and has not been tested against direct observations of school communication or surveys of parents and community members. TALIS is cross-sectional, limited here to lower-secondary teachers, and based on self-report. The OECD average is a useful benchmark but not a culturally neutral standard. The analysis also draws heavily on a dissertation framework developed for Uzbekistan, so the role of mahalla and other institutions should not be generalized mechanically to settings with different community structures. These limitations make empirical validation necessary rather than optional.

8.1. Propositions for empirical research

The mechanism can be translated into propositions that are specific enough to test without assuming that digital activity is beneficial in itself.

Proposition 1. The relationship between digital visibility and teacher prestige will be mediated by perceived credibility and transparency; visibility without those qualities will have a weaker or inconsistent association with prestige.

Proposition 2. Dialogic communication with parents and community members will be more strongly associated with relational trust than one-way promotional communication after accounting for communication frequency.

Proposition 3. Communication that presents verifiable professional evidence—such as pedagogical reasoning, student-support practices, or documented professional achievements—will be more strongly associated with credibility than posting frequency or engagement volume.

Proposition 4. Clear school-level communication and conflict-response protocols will reduce the reputational impact of online criticism by giving teachers and stakeholders predictable routes for clarification and resolution.

Proposition 5. The relationship between AI-assisted communication and public trust will depend on human review, privacy protection, and institutional guidance rather than on AI use alone.

A mixed-method design would allow these propositions to be examined without reducing trust to a single survey item. Teacher and parent questionnaires could be paired with analysis of school communication channels and interviews with school leaders or community representatives. Digital content would be more informative if classified by purpose—such as instructional explanation, administrative information, professional recognition, crisis response, or informal social communication—than if measured only by frequency. Trust measures can draw on respect, competence, integrity, and personal regard (Bryk & Schneider, 2002), while professional identity can be examined separately to determine whether public communication changes how teachers understand their own role (Beijaard et al., 2004). Longitudinal or repeated-measures designs would be especially valuable for distinguishing short-lived attention from durable recognition.

This research agenda also guards against technological determinism. A high rate of AI use or social-media activity is not evidence of professional modernization by itself. The relevant question is whether technology helps stakeholders understand professional reasoning while preserving human responsibility, protected boundaries, and reciprocal relationships. That is the point at which digital practice becomes relevant to prestige rather than merely visible.

9. Conclusion

Digital communication has become part of the social environment in which teacher prestige is formed, but prestige should not be confused with reach. The mechanism developed here begins with professional practice, moves through transparent representation and dialogic interpretation, and culminates in social recognition that feeds back into expectations for continued professional quality. Institutional credibility holds the sequence together. Without it, greater visibility can produce attention without trust.

For Uzbekistan, TALIS 2024 describes a context in which lower-secondary teachers report high social valuation and substantial use of AI, alongside comparatively high satisfaction with employment conditions. These indicators do not demonstrate the effects of digital communication, but they make the governance of digital professionalism consequential. Schools and teachers have

more to gain from communication that explains real professional work than from communication designed chiefly to display success.

A durable strategy therefore combines clear institutional channels, privacy protection, realistic response norms, professional development, community partnership, and human oversight of AI-assisted communication. When digital tools are embedded within the wider school-family-mahalla-public relationship, they can help professional work become understandable and trustworthy. When they are detached from practice and treated as instruments of promotion, they offer visibility without the institutional credibility on which lasting prestige depends.

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THEORETICAL AND METHODOLOGICAL FOUNDATIONS OF INNOVATIVE TEACHING METHODS IN FUTURE TEACHER PREPARATION: A CONCEPTUAL SYNTHESIS

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Abstract. *Teacher education must prepare future teachers for work that is intellectually demanding, relational, and increasingly mediated by digital tools. This conceptual paper examines the methodological foundations for using innovative teaching methods in the professional preparation of future teachers, with particular attention to active learning, digital educational resources, simulation, and project-based learning. Innovation is treated not as the use of fashionable techniques but as purposeful redesign of learning around professional tasks, guided practice, feedback, and reflection. A conceptual synthesis of research on higher education and teacher preparation is used to identify conditions under which these approaches are educationally productive. The analysis indicates that active methods are strongest when they are aligned with course objectives, require students to make pedagogical decisions, and include explicit criteria for reflection and assessment. Digital resources add value when they extend representation, interaction, or feedback rather than reproduce lecture content. Simulations create protected spaces for rehearsal, while projects connect knowledge with sustained inquiry and professional artifacts. The paper proposes an integrated model in which teacher educators move among explanation, modeling, facilitation, observation, and feedback, while students move from interpretation to enactment and justified professional judgment. The argument is particularly relevant to courses such as Pedagogical Competence and to wider efforts to narrow the gap between university coursework and classroom practice.*

Keywords: *innovative teaching methods, teacher education, professional competence, active learning, simulation, project-based learning, digital competence.*

Introduction

The professional preparation of future teachers cannot be reduced to the transfer of pedagogical information. A student may reproduce definitions of classroom management, assessment, motivation, or differentiation and still be uncertain when a classroom situation requires a timely decision. Teaching knowledge becomes professionally meaningful when it can be interpreted, adapted, enacted, and examined in relation to learners and context. This problem explains the growing interest in approaches that place future teachers in intellectually active and practice-oriented learning situations.

Research on teacher education has repeatedly identified the need to connect university study with the work of teaching. Strong preparation systems tend to link theory, clinical experience, inquiry, and structured reflection rather than treating them as separate elements (Darling-Hammond, 2017). Practice-based teacher education develops the same argument methodologically: future teachers need repeated opportunities to study professional practices, rehearse them, receive feedback, and refine their judgment (Matsumoto-Royo & Ramírez-

Montoya, 2021). In this setting, innovative should describe a change in the organization of learning, not simply the presence of a new device, application, or classroom activity.

This distinction matters in a course such as Pedagogical Competence, where students are expected to join conceptual knowledge with communication, decision-making, self-development, and professional responsibility. Digital materials, simulations, collaborative tasks, and projects can contribute to these outcomes, but only when their design requires meaningful thought. An activity can be interactive yet shallow; a digital presentation can be attractive yet cognitively passive; a group project can produce an artifact without producing sound pedagogical reasoning. The central question is therefore whether a method requires the learner to perform the kinds of thinking and action that professional teaching demands.

This paper develops that argument through a conceptual synthesis of scholarship on active learning, practice-based teacher education, professional digital competence, simulation, and project-based learning. Its purpose is to clarify principles for selecting and combining innovative methods in the preparation of future teachers.

Method: Conceptual Literature Synthesis

The paper uses a conceptual literature-synthesis approach rather than an empirical or systematic-review design. The analysis draws on established frameworks and research syntheses addressing active learning in higher education, teacher preparation, digital competence, simulation, and project-based learning. Priority is given to sources that clarify mechanisms of learning, summarize evidence across studies, or examine pre-service teachers directly. The source set includes foundational work on technological pedagogical content knowledge, international research on teacher preparation, systematic and scoping reviews of practice-based and simulation-based teacher education, and recent reviews of digital and project-based learning.

The literature was read comparatively around four questions: What kind of student activity does each method require? What professional capacity can that activity develop? What role does the teacher educator perform? What design weaknesses can reduce the educational value of the method? The synthesis is interpretive. It does not estimate pooled effects or claim exhaustive coverage of the field. Its contribution lies in bringing several lines of research into one methodological framework for the professional preparation of future teachers.

Innovative Learning as Designed Professional Activity

Active learning is often recognized through visible classroom behaviors such as discussion, problem solving, peer work, or case analysis. Its deeper feature is cognitive participation. Students must retrieve, apply, compare, explain, judge, or create rather than remain primarily occupied with listening and note taking. Evidence from higher education supports this general direction. A meta-analysis in humanities and social sciences found higher learning achievement under active instruction than under traditional lecturing, with positive results also evident in education-related studies (Kozanitis & Nenciovici, 2023). This does not make explanation obsolete. Direct instruction remains useful when students need concepts, terminology, or models. The issue is how explanation is connected to tasks in which students must use what they have learned.

For future teachers, active learning should be tied to professional objects of thought. A discussion becomes more purposeful when students interpret a classroom episode, defend an instructional choice, or compare responses to a learner's difficulty. A case is more instructive when it contains incomplete or competing information, because actual teaching rarely offers perfectly arranged problems. Students then have to identify what matters, consider alternatives, and justify action.

Practice-based teacher education offers a useful structure for this process. Reviews of programs organized around core teaching practices show the value of cycles that represent practice, break it into learnable components, provide approximation or rehearsal, and return to analysis and feedback (Matsumoto-Royo & Ramírez-Montoya, 2021). This structure protects against a common weakness in innovative teaching: activity without cumulative development. When each method belongs to a sequence, students can see how concepts support action and how reflection improves later action.

The teacher educator remains intellectually central. Moving away from information transmission does not mean withdrawing from instruction. The role becomes more varied: explaining a concept, modeling a decision, organizing a rehearsal, questioning students' reasoning, or supplying criteria for evaluating a product. Productive independence is designed and supported; it is not created by assigning a task and leaving students alone.

Digital Educational Resources: From Display to Pedagogical Use

Digital resources are now part of ordinary educational practice, but access to technology should not be confused with professional digital competence. The TPACK framework emphasizes that effective technology integration depends on the relationship among content, pedagogy, and technology rather than technical skill in isolation (Mishra & Koehler, 2006). DigCompEdu likewise treats digital competence as a professional capacity that includes selecting resources, organizing teaching and learning, assessing students, empowering learners, and developing learners' digital competence (Redecker, 2017). A recent systematic review further shows that digital resources are tied to the professional knowledge required to select, adapt, create, and evaluate materials for educational purposes (Heine et al., 2023).

In Pedagogical Competence, digital resources can represent abstract relationships through diagrams, provide contrasting classroom cases, support low-stakes checks of understanding, enable collaborative annotation, and preserve records of student work for later reflection. These functions are stronger than simple substitution. Turning a lecture outline into slides changes the medium without necessarily changing the learning process. Asking students to annotate a classroom video and connect observed actions to pedagogical principles creates a different kind of professional analysis.

Design choices remain decisive. Visual density, irrelevant animation, and simultaneous streams of information can distract from the learning goal. Digital tools can also create an appearance of participation when students click or post without explaining their reasoning. The central question should be what the tool permits the learner to notice, practice, compare, receive feedback on, or create. Teacher educators should model this reasoning because pre-service teachers learn from the instructional design they experience.

Equity must also be considered. Students differ in access, confidence, and previous experience with digital platforms. Professional preparation should therefore provide technical orientation where needed and avoid assessing technological fluency when the intended outcome is pedagogical understanding. Digital competence grows when students use technology in authentic instructional tasks and then examine why a particular choice was or was not appropriate.

Simulation and Rehearsal of Professional Judgment

Simulation addresses a persistent difficulty in teacher preparation: novices need practice before they are fully responsible for a real class. Role plays, structured scenarios, virtual environments, and mixed-reality simulations create spaces in which students can rehearse responses to classroom situations and study the consequences. A scoping review of physical and

mixed-reality simulation in pre-service teacher training found evidence of benefits for confidence, self-efficacy, classroom-management skills, communication, and reflection, while also noting that the evidence base remains less developed than in fields such as medicine (Ade-Ojo et al., 2022).

The educational power of simulation comes from approximation, not imitation for its own sake. A useful simulation isolates a meaningful aspect of professional work and makes it available for repeated practice. Students may rehearse how to respond when a learner challenges an instruction, how to question a student without supplying the answer, or how to conduct a difficult parent-teacher conversation. The scenario should be complex enough to require judgment but focused enough for observation and feedback.

Preparation determines much of the quality. Students need a clear professional problem, roles or conditions, time limits, and criteria that direct attention to the intended competence. Debriefing is equally important. Without it, a simulation may remain memorable but pedagogically ambiguous. After the activity, participants can reconstruct key moments, explain why they chose a response, identify evidence they missed, and consider an alternative action. The teacher educator can then connect experience to theory and help students distinguish personal preference from pedagogically defensible judgment.

Simulation also changes the status of error. A rehearsal can treat error as information rather than failure. This requires critique that is specific, evidence-based, and directed at practice rather than personality. Repeated cycles of rehearsal, feedback, and re-enactment can make improvement visible and place reflection inside the learning process rather than after it.

Project-Based and Creative Learning

Project-based learning extends professional learning across a longer period. Students investigate a meaningful problem, make planning decisions, produce an artifact, and usually present or defend the result. A review of project-based learning in higher education identified outcomes across cognitive, affective, and behavioral domains, while warning that assessment often relies heavily on self-report and does not always examine products and learning processes closely enough (Guo et al., 2020). In teacher education, a systematic review of online project-based learning reported positive effects on pre-service teachers' knowledge, professional skills, and learning attitudes, together with challenges related to technology, workload, and preparedness (Uyen et al., 2023).

For future teachers, project work is strongest when the product has a recognizable professional purpose. Students might design a short instructional unit, develop an assessment package with scoring criteria, create differentiated learning tasks, prepare a family-engagement plan, or construct a digital resource and justify its use. These tasks bring planning, subject knowledge, learner analysis, assessment, communication, and revision into one piece of work.

Project work can also support professional identity because students must take responsibility for choices and make those choices visible to others. Research on a project-based course designed as a pedagogy of practice found that participation contributed to pre-service teachers' professional identity development (Tsybulsky & Muchnik-Rozanov, 2023). The implication is that a project can bridge academic study and a developing sense of oneself as a teacher, especially when students explain the educational reasoning behind the artifact and revise it after critique.

Group projects, however, can conceal unequal participation, and ambitious products can consume time without deepening understanding. Assessment should therefore include the final artifact and evidence of process: planning notes, decisions, peer feedback, revisions, or individual

reflection. Rubrics should emphasize professional criteria such as alignment, appropriateness for learners, quality of assessment evidence, and justification of instructional choices.

An Integrated Methodological Framework for Pedagogical Competence

The approaches discussed above are most defensible when treated as complementary rather than competing methods. Active learning supplies the general principle of student intellectual participation. Digital resources broaden access to representations, examples, collaboration, and feedback. Simulation creates concentrated opportunities for rehearsal. Project-based learning supports sustained inquiry and the production of professional work. Their common value is that they make knowledge operational.

Table 1 summarizes the methodological fit among these approaches. Method selection should begin with the intended professional action. If the aim is to help students recognize patterns in classroom interaction, a digitally annotated case may be more appropriate than an extended project. If the aim is to improve moment-to-moment communication, simulation may provide the needed rehearsal. If students must integrate planning, assessment, and resource design, a project may be suitable. Innovation lies in this alignment.

Table 1

Methodological Alignment of Innovative Approaches in Teacher Education

Approach	Professional learning task	Competence emphasized	Design condition
Active learning	Analyze cases, compare alternatives, explain and justify decisions	Pedagogical reasoning and conceptual application	Tasks must require substantive reasoning and align with the course objective.
Digital resources	Interpret, annotate, create, collaborate, and use feedback	Digital-pedagogical judgment	Technology should add representational, interaction, or feedback value and remain accessible.
Simulation	Rehearse targeted classroom responses and debrief performance	Communication, classroom management, and adaptive judgment	Use a focused scenario, observable criteria, structured debriefing, and repeated practice.
Project-based learning	Investigate an authentic problem and produce a professional artifact	Integration, planning, assessment, autonomy, and professional identity	Assess both process and product; control scope and make individual contribution visible.

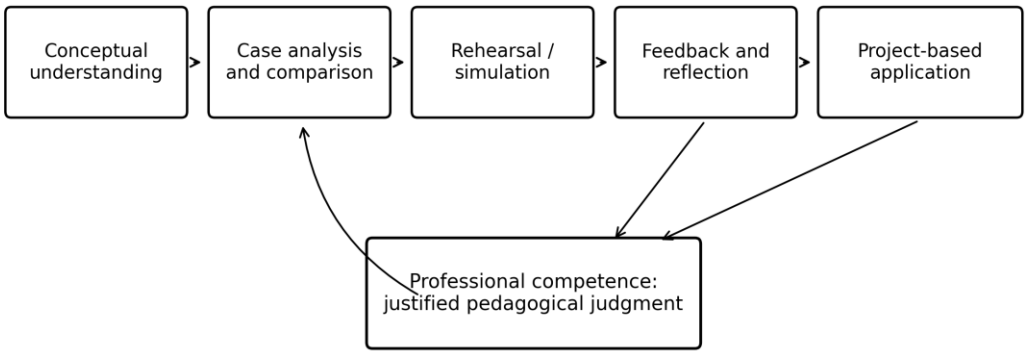
Note. Original synthesis of the literature reviewed in this paper.

Implications for Teacher-Education Practice

A coherent course can organize the methods as a developmental sequence. Students first encounter and discuss a concept, examine it in examples, rehearse a related practice, receive feedback, and apply the learning in a larger professional task. Reflection links the stages. Figure 1 represents this pathway as a cycle from conceptual understanding to professional competence rather than as a one-way movement from teacher explanation to student reproduction.

Figure 1

Integrated Pathway From Pedagogical Knowledge to Professional Competence



Note. Author's conceptual synthesis based on the literature discussed in the paper; the chart does not display empirical effect sizes.

The framework also clarifies changing roles. The teacher educator moves among explanation, modeling, task design, observation, questioning, and feedback. The student moves among interpretation, decision-making, enactment, collaboration, and self-evaluation. Responsibility becomes more distributed, but standards do not become weaker. Active methods require clear criteria because students need to know what counts as sound reasoning and professional performance.

Teacher educators should therefore plan backward from professional competence. A method should be chosen because it gives students an appropriate form of practice, not because it is popular. Reflection should also be attached to evidence. Instead of asking only what students liked or found difficult, prompts can ask what they noticed, which principle guided a decision, what evidence supports that interpretation, and what they would change in a second attempt.

Assessment needs to match the complexity of the learning. Tests can examine conceptual knowledge, but professional preparation also requires evidence from performances, artifacts, explanations, and revisions. Reviews of practice-based teacher education have noted that assessment of core practices remains comparatively underdeveloped (Matsumoto-Royo & Ramírez-Montoya, 2021). Courses should make criteria visible and use them consistently across rehearsal, projects, and final evaluation.

Digitalization should be treated as a pedagogical matter. Pre-service teachers need opportunities to experience well-designed uses of technology, analyze why those uses work, and practice making similar decisions. A student who knows many applications but cannot connect them to learners, content, and assessment has limited professional digital competence.

The shift toward active and practice-oriented learning should be gradual and structured. Novices often need explicit models before open-ended tasks become productive. Teacher educators can reduce support as students demonstrate stronger judgment. Such sequencing respects the complexity of teaching and avoids placing the burden of discovery entirely on beginners.

Conclusion

Innovative teaching methods can strengthen the professional preparation of future teachers when innovation is defined by the quality of learning design rather than novelty. Active learning, digital educational resources, simulation, and project-based learning each provide a different route for connecting pedagogical knowledge with professional action. Their value depends on alignment with learning goals, suitable levels of challenge, explicit criteria, feedback, and opportunities for reflection.

For courses such as Pedagogical Competence, an integrated approach can move students from understanding concepts to examining practice, rehearsing decisions, producing professional artifacts, and evaluating their own work. The teacher educator does not become less important. The role becomes more precise and varied, combining direct instruction with modeling, facilitation, observation, and feedback. Students, in turn, assume greater responsibility for reasoning, collaboration, and improvement.

The methodological principle that follows is straightforward: future teachers should learn important pedagogical ideas in forms that require them to think and act with those ideas. When innovative methods are organized around that principle, they can narrow the distance between knowing about teaching and learning to teach.

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CONVERGENT PATRIOTIC EDUCATION IN POST-SOVIET UZBEKISTAN: JADID HERITAGE, COMPARATIVE MODELS, AND A STEAM-INTEGRATED CURRICULUM DESIGN

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Abstract. *States emerging from imperial or Soviet rule have repeatedly turned to the school to rebuild national identity, yet the pedagogical form of that project is seldom specified with the care given to its aims. This article develops the theoretical and curricular foundations of a convergent model of patriotic education for Uzbekistan's general secondary schools. It combines a historical-hermeneutic reading of classical Central Asian ethics and the Jadid reform movement, a comparative analysis of seven national models informed by field research in Japanese schools, and the specification of a curriculum refined over a three-year school pilot. The Jadid reformers, it argues, supply an endogenous warrant for what international scholarship calls constructive or chastened patriotism: attachment demonstrated through knowledge, moral reasoning and civic contribution rather than declaration. The model translates that warrant into a three-layer architecture: the weekly Kelajak Soati (Future Hour) sequence; interpretive and case-based methods (STOP, Talqin, Five Responses to One Threat, Ideological Ideal); and STEAM project work in which students document, model and publish the heritage of their own localities. A knowledge–belief–action assessment frame keeps cognitive, affective and behavioural outcomes apart. The article closes with four testable propositions and with the design conditions under which a values-based curriculum can avoid sliding into uncritical loyalty.*

Keywords: *patriotic education, civic education, convergent pedagogy, curriculum design, STEAM, Jadid pedagogy, comparative education, Uzbekistan.*

Introduction

Every post-independence state faces the same pedagogical dilemma. It must give young citizens a reason to identify with a polity that is, historically speaking, new, while preparing them for labour markets and information environments that pay little attention to national borders. Uzbekistan illustrates the problem with unusual clarity. Three decades after independence, the country inherited a school system shaped by Soviet ideological instruction, and it now educates a cohort that receives much of its cultural formation through global platforms rather than through family, mahalla, or classroom.

Policy has responded at scale. Presidential Decree PF-60 (2022) set out the Development Strategy of New Uzbekistan for 2022–2026, whose 91st goal commits the state to strengthening the military-patriotic upbringing of youth. Cabinet Resolution No. 267 (29 June 2023) approved a Concept for Increasing the Effectiveness of Military-Patriotic Education for 2023–2027. Decree PF-134 (2022) approved the National Programme for the Development of Public Education, and

Ministerial Order No. 308 (25 August 2025) replaced the traditional Friday class hour with a Monday *Kelajak Soati* lesson delivered as the first lesson of the school week. Normative ambition, in short, is not the constraint.

The constraint is pedagogical. Normative texts define what patriotic education should achieve but say little about how a lesson should achieve it, and published evidence on what Uzbek adolescents take patriotism to mean is scarce; Uzbekistan did not take part in the 2022 cycle of the IEA International Civic and Citizenship Education Study, the main international benchmark of civic knowledge (Schulz et al., 2023). Schools have therefore tended to fill new curricular time with the forms they already know, assemblies, recitation and commemoration, which build familiarity with symbols faster than understanding. Normative texts have multiplied faster than pedagogical designs, a gap that might be called a reform-capacity lag.

International literature has framed the problem as a tension rather than a technique. Liberal theorists warn that patriotic instruction readily becomes indoctrination when it suppresses historical complexity (Archard, 1999; Callan, 1997); communitarian and character-education traditions counter that civic attachment cannot be produced by procedural knowledge alone (Lickona, 1991). Comparative studies of post-socialist systems show that the transition from ideological to civic education tends to stall when schools reproduce older didactic forms with new content (Silova, 2010). The question this article pursues is therefore one of design: what would a pedagogically specified model look like that integrates national heritage with interactive, technology-mediated instruction while resisting the slide into uncritical loyalty?

We address three research questions. RQ1: What conceptual resources in Central Asian educational thought and contemporary comparative practice can ground a non-coercive model of patriotic education? RQ2: How can those resources be operationalised in the existing institutional architecture of Uzbek general secondary schools? RQ3: What design principles and testable propositions follow for implementing and evaluating such a model?

Theoretical Framework and Literature Review

Indigenous Foundations: From Classical Ethics to Jadid Reform

The Central Asian intellectual tradition supplies a vocabulary of civic obligation that predates the modern nation-state; like most national identities, the Uzbek one draws on sources older than the state that now claims them (Smith, 2003). Al-Farabi framed the virtuous city as a moral community whose members owe their excellence to collective life; Beruni treated scholarship itself as service to the common good; and Navoiy, in *Mahbub ul-Qulub*, located human worth in service to one's land and people. The heroic epic *Alpomish*, which the literary scholar O. Sharafiddinov described as a spiritual constitution of popular self-awareness, encodes the subordination of personal interest to communal honour. Historical narratives of Jaloliddin Manguberdi's resistance to the Mongols in 1221, and the statecraft principles attributed to Amir Temur in the *Tuzuklar*, have become the main exemplary figures of contemporary curricula (Ahmedov, 1996; Morgan, 1986).

The decisive pedagogical precedent, however, is Jadidism. The late-nineteenth- and early-twentieth-century reformers did not ground patriotism in military valour; they grounded it in literacy, scientific knowledge, and moral self-discipline. Behbudiy's formulation that the school is the fortress of the nation, and his three-part programme of national self-awareness, liberation from ignorance, and the use of knowledge for public prosperity, defined patriotism as an epistemic achievement, a conception his historical survey *Muntahab at-tarix* (Behbudiy, 1909) was written

to serve. Fitrat's *Munozara* and *Rahbari najot* (Fitrat, 1915) argued that knowledge without morality, and pride without enlightenment, cannot sustain a free people. Avloniy, in *Turkiy guliston yoxud axloq* (1913), called education "a matter of life and death" for the nation and insisted that civic feeling begins in early childhood.

This lineage matters for the present study. It offers an endogenous, reform-oriented model of patriotism that is compatible with modern scientific education rather than opposed to it, and it allows Uzbek curricula to reach past the Soviet period without reproducing pre-modern particularism. Post-independence state doctrine continued the line, placing patriotism at the centre of spiritual education (Karimov, 2008) and, under the New Uzbekistan agenda, tying it to modernisation and openness to the world (Mirziyoyev, 2021).

Comparative Models and the Patriotism–Nationalism Boundary

Comparative evidence shows how widely states differ in what they ask schools to cultivate. Polish thought has drawn the boundary between patriotism and nationalism with particular care. Karol Wojtyła, writing as John Paul II, defined patriotism as love of one's native land that accords other nations the same rights it claims for its own, and set it against a nationalism concerned with its own nation's good alone (John Paul II, 2005). British policy after the July 2005 London bombings took an institutional rather than a philosophical route, embedding national history in the citizenship curriculum (the 2007 *Diversity and Citizenship* review) and introducing citizenship ceremonies in 2008. Anglophone philosophers responded with a sceptical literature: Archard (1999) argued that the selective distortion of history needed to inspire love of country imposes epistemic costs schools should not accept, and Callan (1997) proposed a "chastened patriotism" that survives honest historical inquiry. A further distinction between absolute patriotism, valued unconditionally, and conditional patriotism, justified by a country's conduct, maps directly onto this debate.

East Asian systems integrate civic feeling into moral education, and Japan received the closest attention in this study. Field research in Tokyo, including observation at Momoi School No. 2 in Suginami ward, a specialist lecture on moral education at the University of Tsukuba, and collaboration with the Moralogy Foundation and Reitaku University, documented a compulsory moral education period, traceable to the 1958 national guidelines, organised around 22 target virtues in five thematic modules. Its "education of the heart" (*kokoro no kyōiku*) combines etiquette, empathy, and responsibility toward nature and culture, and teachers draw freely on anime and manga as moral texts. South Korea fuses character education with music and visual arts. The United States, lacking an ethnic or linguistic basis for national identity, anchors civic attachment in constitutional principles of liberty and equality. Russia's Yunarmiya movement represents a militarised alternative organised through youth clubs; Turkey uses an annual National Values Week. Table 1 condenses these models and the lessons the present design draws from them.

Table 1

Comparative Models of Patriotic and Civic Education and Transferable Elements for Uzbekistan

Country	Dominant model	Core mechanism	Element adapted in this study
Japan	Moral (character) education	22 virtues in 5 modules; compulsory moral lessons	Virtue-module structure; individual-differential delivery
South Korea	Arts-integrated character education	Music, visual arts, multimedia biographies of national figures	Visual and digital narrative of historical figures

United Kingdom	Civic-constitutional	Citizenship curriculum; national history; ceremonies (2008)	Explicit civic-knowledge component
United States	Civic-constitutional	Flag rituals; civic education; principle-based identity	Respect for state symbols framed by civic principle
Poland	Philosophical-typological	Patriotism distinguished from nationalism; equal regard for other nations	Boundary concepts in the knowledge component
Russia	Military-patriotic	Yunarmiya network of youth clubs	Systematic extracurricular organisation
Turkey	Commemorative	National Values Week	Calendar-based value programming

Note. Compiled from the comparative analysis conducted for this study, including a field expedition to Japanese schools and institutes.

Conceptual Synthesis: The Convergent Approach

We define the convergent approach as the deliberate technological integration of upbringing (*tarbiya*) and instruction (*ta'lim*), combining national and global educational practices so that civic identity, scientific-technical competence, and social activity are developed through the same learning activities rather than in separate subjects. The term borrows from convergence education, in which disciplinary boundaries are dissolved around authentic problems. Here the problem is civic: what one knows about one's country, what one values in it, and what one is prepared to do for it.

Five approaches underpin the model: systemic (integrating information across disciplines), personality-oriented (protecting psychological well-being and moral autonomy), axiological (treating patriotism as a value rather than a slogan), ethnopedagogical (drawing on folk culture as a pedagogical medium), and activity-based (making the student the agent of learning). These converge on a three-stage developmental sequence—knowledge, belief, and action—that also structures the assessment architecture described below. The Japanese post-war formulation of "Japanese spirit and Western knowledge" (*wakon yōsai*) provided a heuristic, adapted here as the principle that national ethical formation and global scientific competence are complementary rather than competing aims.

Approach

The study is conceptual and design-oriented and combines three strands of analysis. The first is a historical-hermeneutic reading of classical Central Asian ethical texts and of the educational writings of the Jadid reformers, focused on how each relates knowledge, morality and service to the homeland. The second is a comparative analysis of patriotic and civic education in seven countries, based on program documents and the scholarly literature and, for Japan, on field research in schools and institutes. The third is design specification: the translation of the resulting principles into a curriculum architecture for Uzbek general secondary schools. The architecture was developed and refined between 2022 and 2025 in a pilot in ten schools in Tashkent, the Fergana Valley and Navoiy. The outcome evaluation of that pilot is reported in a separate article; the

present paper reports no outcome data and should be read as an account of the model's rationale and design.

The Convergent Curriculum Architecture

The architecture has three components. The first is the *Kelajak Soati* curriculum: 35 weekly 45-minute lessons distributed across four quarters (10, 7, 10, and 8 topics respectively), moving from foundational themes such as "For the Motherland, for the Nation, for the People" through state symbols, tolerance, honesty, and healthy living to national culture and historical figures. Lessons combine a motivational phase with knowledge-building dialogue, short video material, and interactive tasks, and are supported by scenarios and guides on milliytarbiya.uz. The second component is a supplementary pocket guide for grades 1–11, *Mening ma'naviy hamrohim* (My Spiritual Companion), which uses real-life cases, career orientation, and language learning rather than functioning as a separate subject. The third component is a set of interactive methods developed for the model (Table 2).

Table 2

Interactive Methods of the Convergent Model

Method	Procedure	Targeted competence
STOP (Stop–Think–Observe–Proceed)	Students pause, reason, observe context, then act on a moral or civic case (e.g., online conflict, witnessing injustice, hearing disparagement of the country)	Reflective judgement; emotional self-regulation
Talqin (Interpretation)	Text, image, or event → reading/listening → guided questioning → reflection → conclusion	Critical and hermeneutic reading of heritage sources
Five Responses to One Threat	A single civic problem addressed simultaneously from five angles (curriculum, dialogue, film, family, sport)	Systems thinking about social problems
Ideological Ideal	Modelling of an exemplary figure through discussion, participation, and role-play	Value internalisation
Folk games (e.g., Chir aylanma; Kosa, kosa, ne kosa)	Cooperative traditional games with protective and group-identity roles	Cooperation, attention, belonging (primary grades)
Project and case work	Five competence cases, e.g., "Heroes of Our Mahalla," "Not what the Motherland gave me, but what I did for it"	Enacted civic action; local inquiry

STEAM integration is the component that gives the model its distinctive character. In project work, students document the history of their own mahalla through interviews and archival photographs, produce short digital media, and build physical or 3D models of historical monuments, so that civic content travels through the same activities that develop technological and artistic skill. Multimedia projects on the lives and discoveries of the region's eminent scholars connect national heritage to science and mathematics, which is precisely the connection the Jadid reformers drew. The aim is not to decorate STEAM lessons with national symbols but to make scientific and technical work one of the ways in which students come to know their country and contribute to it.

Assessment Architecture

Assessment follows the knowledge–belief–action sequence and keeps its three outcomes apart. Cognitive outcomes (knowledge of the homeland, its symbols, history and exemplary figures) are captured by oral diagnostic questions and parallel written tests; affective outcomes (attitudes toward the homeland and its people) by structured observation, scored on a bipolar scale for younger pupils; and behavioural outcomes (enacted civic disposition) by competence cases and project portfolios assessed against explicit criteria. A teacher questionnaire records staff understanding of national values as contextual information. Composite results classify students into high, medium and low levels, but reporting the three domains separately prevents a gain in knowledge from being presented as a gain in civic action. Diagnostic, formative, summative, expert, portfolio, creative and peer evaluation are combined across the school year.

Discussion

The convergent model rests on a claim that is historical before it is pedagogical: that the Central Asian tradition, read through the Jadids, defines love of country as something demonstrated through knowledge and moral reasoning. If that reading is right, the familiar opposition between national upbringing and modern education is an artefact of the Soviet and early post-Soviet periods rather than a feature of the tradition, and a curriculum can become at once more national and more scientific than the one it replaces.

The architecture also implies an order of effects. Because the knowledge–belief–action sequence places enacted disposition last, and because disposition depends on family, mahalla and the opportunities for participation that public life actually affords young people, a structured weekly sequence should consolidate civic knowledge and attach value to it well before it produces observable civic action. By the same reasoning, declarative policy and ambient exposure to national campaigns should produce little measurable learning on their own. What ought to change outcomes is pedagogical form: interpretation instead of recitation, case-based judgement instead of exhortation, and production instead of reception.

The design also speaks to the international debate summarised above. The liberal objection to patriotic education targets instruction that demands affect without understanding. Methods such as STOP and *Talqin* move in the opposite direction; they require students to reason about cases, including uncomfortable ones such as hearing their country criticised, before responding. The patriotism without nationalism defended by John Paul II (2005) and Callan's (1997) chastened patriotism describe the disposition such methods could cultivate. Whether they do so in practice depends on how teachers handle disagreement. A STOP exercise that ends with a single correct answer reproduces the didactic model it was designed to replace, and American debates show how quickly patriotic schooling becomes a contest over loyalty once that happens (Westheimer, 2007).

Here the Jadid inheritance is analytically useful rather than merely ornamental. Behbudiy, Fitrat, and Avloniy defined patriotism as the outcome of knowledge and moral reasoning, not as a substitute for them. A curriculum that takes this lineage seriously has an internal standard against which to check its own drift toward ritual: if a lesson increases attachment while reducing the capacity to reason about one's society, it has departed from the reform tradition it claims. The convergent model is strongest where it honours this standard—in project work that sends students to document the history of their own mahalla—and weakest where it leans on purely commemorative content.

Two tensions remain open. First, national policy documents frame part of this work in security terms, speaking of immunity against harmful ideas and of ideological threats. Such framing can justify investment, but it risks positioning students as objects to be protected rather than

citizens to be educated, and it sits uneasily with the personality-oriented and activity-based principles of the model itself. Second, a strong military-patriotic track now runs alongside general schooling: military-patriotic classes operate in 56 schools, 121 Young Guardsman classes enrol 3,253 students in grades 6–11, and the Temurbeklar Maktabi lyceums admit approximately 150 students annually, including girls since 2024/2025. The relationship between this track and civic education in ordinary classrooms has not been studied and should be.

Propositions for Evaluation

Four propositions follow from the design and can be tested as *Kelajak Soati* is rolled out nationally. First, gains should concentrate at the transition from the low to the medium level of competence, in knowledge and attitude, before they appear as enacted disposition. Second, because the model's active ingredients are pedagogical and relational rather than technological, its effects should not depend on a district's digital infrastructure, and rural schools should benefit as much as urban ones. Third, classes taught through the interpretive methods should show higher constructive patriotism, and no higher blind patriotism, than classes taught through commemoration (Schatz et al., 1999). Fourth, where teachers close discussion with a single correct answer, gains in attachment should arrive without gains in reasoning about public life, the signature of drift toward ritual. Testing these propositions will require validated instruments, individual-level data and, where possible, randomised or stepped-wedge designs.

Limitations

As a conceptual and design study, the article establishes coherence and warrant rather than effect. The reading of Jadid texts privileges their educational writings and may understate the political tensions within the movement (Khalid, 1998). The comparative analysis is selective and relies partly on program documents whose implementation varies within each country, and the Japanese fieldwork covered a small number of institutions. The assessment frame is specified, but its instruments still require psychometric validation, and the propositions above remain to be tested. Finally, figures on the military-patriotic track come from official institutional sources rather than peer-reviewed datasets and should be read as context rather than evidence.

Conclusions and Implications

A convergent model of patriotic education can be built from resources that Uzbek schools already possess: a reform tradition that treated knowledge as the truest service to the homeland, a weekly protected lesson, and the local heritage of every mahalla. Combined with interpretive methods and STEAM project work, these resources yield a curriculum in which national attachment is expressed through understanding and contribution rather than recitation.

Four implications follow for policy and practice. Assessment frameworks should separate cognitive, affective, and behavioural indicators so that gains in one are not reported as gains in all. Teacher preparation should treat the facilitation of disagreement as a core competence of civic educators, not an optional extra. School–family–mahalla cooperation should be institutionalised, because enacted civic disposition requires participation that classrooms alone cannot supply. And the *Kelajak Soati* programme, now national, should be accompanied by an independent evaluation using validated instruments and, where possible, randomised designs.

For comparative research, Uzbekistan offers a case in which a post-Soviet state is attempting to rebuild civic education from an endogenous reform tradition rather than importing a single foreign template. Whether that attempt yields reflective citizens or merely compliant ones will be decided less by the content of the curriculum than by the pedagogy through which it is taught.

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ROLE-PLAYS AND SIMULATIONS AS A MEANS OF ORAL COMMUNICATION IN PROFESSIONAL SITUATIONS FOR FUTURE ENGINEERS

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Abstract. *The article examines role-plays and simulations as a means of developing future engineers' oral communication in English in professional situations. It analyses the psychological, linguistic and methodological foundations of these techniques, including activity theory, the contextual approach, the output and interaction hypotheses and experiential learning. The difference between role-play and simulation is clarified, and a typology of professional situations typical of engineering practice is proposed. The article describes the four stages of organising a role-play or simulation — briefing, preparation, action and debriefing — and offers sample scenarios, role cards, language support and assessment criteria. It is argued that role-plays and simulations reduce the gap between classroom language practice and real professional communication, increase students' confidence and develop their fluency, interactive competence and ability to act appropriately in typical engineering situations.*

Keywords: *role-play, simulation, future engineers, oral communication, professional situation, ESP, contextual approach, speaking skills, interactive competence, debriefing*

Introduction. The internationalisation of industry, energy, construction and information technology in Uzbekistan has made English an everyday working language for many engineers. Engineers communicate with foreign partners at site inspections, technical meetings and negotiations, provide support to equipment users and take part in job interviews at international companies. The Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030 [1] stresses the need to train specialists who can apply foreign languages in their professional activity. M.J. Riemer [2] also points out that communication skills are as important for the global engineer as technical knowledge.

Nevertheless, English classes at technical universities often give students few opportunities to speak in conditions resembling their future work. Students may know technical terms and grammar rules, yet they feel anxious and lost when they have to react spontaneously to a client's complaint, explain a fault over the phone or defend a design decision. The classroom typically offers controlled exercises, while real professional communication is unpredictable, interactive and goal-oriented.

Role-plays and simulations are among the most effective techniques for bridging this gap. They place students in realistic professional situations, give them roles with specific goals and require them to use English to achieve those goals. The aim of this article is to substantiate the use of role-plays and simulations as a means of developing future engineers' oral communication in professional situations and to propose a methodological model for their organisation in ESP classes.

Role-play and simulation: concepts and differences. G.P. Ladousse [3] describes role-play as an activity in which learners take on roles and act in an imaginary situation, which allows

them to practise language they will need outside the classroom. K. Jones [4] defines simulation as a reality of function in a simulated and structured environment: participants do not pretend to be someone else, but act as professionals with real duties and responsibilities within the given scenario. C. Livingstone [5] notes that in role-play the participant usually receives a ready-made character and attitude, whereas in simulation the participant keeps his or her own personality and makes decisions based on the information provided.

For engineering education, both forms are valuable. Role-play is suitable for short, focused practice of particular speech functions, for example handling a complaint or giving instructions. Simulation is more complex and longer: it reproduces a whole professional event, such as a design review meeting or an emergency response, with documents, data, time limits and consequences of decisions. D. Crookall and R.L. Oxford [6] show that simulation and gaming create a rich environment in which language is learned through purposeful communication rather than through memorisation.

Theoretical foundations. The use of role-plays and simulations is supported by several theories. L.S. Vygotsky [7] showed that learning takes place through social interaction and that learners can perform beyond their current level with the support of more competent partners. A.A. Leontyev [8] described speech as an activity driven by a motive and consisting of planning, execution and control; a role with a clear goal provides exactly such a motive. A.A. Verbitsky [9] developed the contextual approach, according to which professional education should gradually move students from academic activity to quasi-professional and educational-professional activity. Role-plays and simulations are typical forms of quasi-professional activity, because they model the content and relationships of future work in the classroom.

E.I. Passov [10] argued that speaking should be taught through speech situations that reflect real communication and involve the learner personally. From the perspective of second language acquisition, S.D. Krashen's [11] affective filter hypothesis suggests that anxiety blocks language acquisition; a role can reduce anxiety, since students speak on behalf of a character or a professional position rather than exposing themselves. M. Swain's [12] output hypothesis holds that producing language forces learners to notice gaps in their knowledge, and M.H. Long's [13] interaction hypothesis shows that negotiating meaning with interlocutors promotes acquisition. Finally, D.A. Kolb's [14] experiential learning cycle explains the importance of reflection after the activity: concrete experience becomes learning only after it is analysed and generalised.

Typology of professional situations. Needs analysis of engineering communication makes it possible to identify typical situations that can serve as the basis for role-plays and simulations. They include: communication with clients and partners (presenting a project, handling complaints, negotiating contracts); internal teamwork (planning meetings, design reviews, progress reports); technical support and instruction (troubleshooting, explaining operation of equipment, safety briefings); emergency and incident situations (reporting a fault, coordinating repair, informing the public); and career-related situations (job interviews, introducing oneself at an international conference). Examples of scenarios developed on this basis are presented in Table 1.

Table 1. Role-play and simulation scenarios for engineering students

Scenario	**Situation and roles**	**Speech functions practised**

Site inspection	A foreign inspector checks a construction site; roles: site engineer, inspector, safety officer	Describing work progress, explaining deviations, accepting criticism, promising corrective actions
Equipment purchase negotiation	A plant buys a compressor from a foreign supplier; roles: chief engineer, procurement manager, supplier's sales engineer	Asking for specifications, comparing offers, bargaining, reaching agreement
Emergency at a substation	A transformer fault causes a power cut; roles: duty engineer, dispatcher, repair team leader, client	Reporting an incident, giving instructions, clarifying, reassuring the client
Design review meeting	An international team reviews a bridge design; roles: designer, structural engineer, client, environmental expert	Presenting a design, raising concerns, justifying decisions, proposing alternatives
Technical support call	A foreign user cannot start a CNC machine; roles: support engineer, operator	Troubleshooting questions, step-by-step instructions, checking understanding
Job interview	A graduate applies to an international engineering company; roles: candidate, HR manager, technical director	Self-presentation, describing projects and skills, answering technical questions

Each scenario is supplied with materials that make the situation realistic: a short description of the company and the problem, technical data (drawings, specifications, schedules, budgets), role cards and language support. A role card states who the participant is, what he or she knows, what goal must be achieved and what constraints exist. For instance, in the negotiation scenario the procurement manager's card says that the budget must not exceed a certain amount and that delivery is needed within six weeks, while the supplier's card states that the minimum price and the earliest delivery date cannot be achieved at the same time. Such information gaps and conflicting interests make genuine negotiation necessary.

Stages of organising a role-play or simulation. Following M. Gredler [15] and K. Jones [4], the work is organised in four stages. At the **briefing** stage, the teacher introduces the situation, distributes materials and roles and explains the rules, time limits and expected outcome. At the **preparation** stage, students study their role cards and technical data, plan what to say and review the necessary language; the teacher provides support in the form of key terminology, functional phrases and model dialogues. At the **action** stage, students carry out the role-play or simulation without interruption by the teacher, who observes, takes notes on language and communication and intervenes only if communication breaks down. At the **debriefing** stage, the participants discuss what happened, how the decisions were made, which communication strategies worked and which did not, and the teacher gives feedback on typical language errors.

Debriefing deserves special attention, since it turns activity into learning. Questions such as *What was your goal and did you achieve it?*, *What made the negotiation difficult?*, *Which phrases helped you to sound polite but firm?* and *What would you say differently next time?* help students reflect on both the professional and the linguistic side of their performance. A repeated performance of the same scenario after debriefing, with roles exchanged, has proved useful for consolidating improvements.

Language support. W. Littlewood [16] distinguishes between pre-communicative activities, which prepare learners for communication, and communicative activities, in which they use the language for real purposes. Role-plays and simulations belong to the second group, but their success depends on careful pre-communicative preparation. For engineering students it is useful to prepare functional phrase banks for each scenario: describing a problem (*We have noticed that the temperature exceeds…*), making suggestions (*Wouldn't it be better to…?*), disagreeing politely (*I see your point, but…*), giving instructions (*First, make sure that… Then…*), checking understanding (*Could you repeat the last figure, please?*). T. Hutchinson and A. Waters [17] emphasise that ESP materials should reflect the target situation; therefore, phrases and vocabulary should be taken from authentic engineering communication, such as meeting minutes, service manuals and correspondence.

The teacher's role. In role-plays and simulations the teacher acts as organiser, controller of time, observer and consultant rather than as the main speaker. J. Harmer [18] advises that teachers should not interrupt fluency-focused activities to correct errors, but should note them and deal with them afterwards. It is also important to adjust the complexity of the scenario to students' level: at the initial stage short role-plays with detailed role cards are used, while at later stages students take part in multi-stage simulations with less support and more unpredictable events.

Assessment. The assessment of students' performance is based on criteria derived from the CEFR Companion Volume descriptors for spoken interaction [20] and from S. Thornbury's [19] recommendations for assessing speaking. The following criteria are proposed: task achievement (whether the communicative goal of the role was reached); fluency and coherence; accuracy and range of professional vocabulary; grammatical accuracy; interactive competence (turn-taking, asking for clarification, reacting to the partner, negotiating); and appropriacy (politeness and register suitable for the professional relationship). Each criterion is scored on a five-point scale. Peer observation sheets and self-assessment based on the same criteria involve students in evaluating communication and develop their reflective skills.

The experience of using role-plays and simulations with engineering students shows several positive effects. Students become more willing to speak, as the role provides both a reason to talk and a degree of psychological protection. The amount of student talking time increases considerably compared with traditional lessons. Students learn to react to unexpected questions and to use communication strategies when they lack words. Finally, the professional content of the scenarios strengthens the connection between English and specialised subjects, which increases students' motivation. As J.J. Jalolov [21] notes, foreign language teaching is effective when learners use the language to solve communicative tasks that are meaningful for them.

Conclusion. Role-plays and simulations are an effective means of developing future engineers' oral communication in English in professional situations. Grounded in activity theory, the contextual approach, the output and interaction hypotheses and experiential learning, they transform the English class into a space of quasi-professional activity in which students use the language to reach real goals.

The typology of professional situations proposed in the article — communication with clients and partners, internal teamwork, technical support and instruction, emergency situations and career-related situations — allows teachers to select scenarios that correspond to the actual needs of engineering practice. The four-stage organisation of the activity (briefing, preparation, action and debriefing), supported by role cards, technical data and functional phrase banks, ensures a gradual transition from guided to independent professional communication. The proposed assessment criteria make it possible to evaluate both the professional effectiveness and the linguistic quality of students' speech.

Further research will focus on the experimental verification of the effectiveness of role-plays and simulations at technical universities of Uzbekistan and on the creation of a bank of engineering scenarios for different specialisations and proficiency levels.

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PSYCHOLOGICAL FOUNDATIONS OF INTERNAL LOCUS OF CONTROL AND ACHIEVEMENT MOTIVATION

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Abstract. *This study investigates the psychological mechanisms underlying achievement motivation, the expectancy–value model, and locus of control, drawing on the theoretical frameworks of D. McClelland, J. Atkinson, and J. Rotter. The research analyzes an individual's tendency toward achievement, fear of failure, perceived probability of task success, and subjective value of outcomes. Particular attention is given to the regulatory role of internal and external locus of control, as well as the interaction between motivational processes and cognitive, affective, and volitional components. The findings demonstrate that achievement motivation is strongly linked to self-awareness, the need for autonomy, and an individual's social learning experiences.*
Keywords: *achievement motivation, locus of control, expectancy–value model, self-determination theory, intrinsic motivation, cognitive evaluation.*

Introduction

The rapid modernization processes currently observed in global education and science increasingly intensify the need for a deeper study of human psychology. Among the psychological factors influencing personality development, motivation, and indicators of success, locus of control occupies a special place. Scientific materials published by the American Psychological Association (APA) emphasize that individuals with an internal locus of control tend to associate their actions and outcomes with personal responsibility, which, in turn, has a significantly positive effect on their academic performance [1]. Research findings indicate that students with an internal locus of control interpret success as the result of their own efforts; therefore, they approach learning with a higher sense of responsibility.

Today, leading higher education institutions, research institutes, and psychological centers around the world are expanding studies on the influence of locus of control on students' learning motivation, responsibility, independent decision-making skills, and academic effectiveness. Observations conducted at universities in China, the United States, the United Kingdom, and Europe confirm the role of internal locus of control in enhancing academic engagement. For example, experimental studies conducted by psychologists at Stanford University revealed that students' internal locus of control significantly increased through psychological training programs [2]. These results demonstrate that the development of locus of control has not only psychological but also pedagogical significance in the educational process.

With regard to the degree of exploration of this issue, in Uzbekistan, scholars such as B.S. Abdullaeva, G.B. Amirova, X.K. Bekchanov, U.A. Butaeva, A.A. Fayzullayev, F.I. Haydarov, A.M. Jabborov, M.A. Jabborova, V.M. Karimova, Z.T. Nishonova, N.Z. Ismoilova, B.R. Qodirov, A.Q. Saitova, N.Sh.Yuldasheva, R.Z. Gaynutdinov, E.G.Gaziev, D. Shokirov, and others have investigated issues of motivation, personal responsibility, learning activity, and locus of control from various perspectives.

In the CIS countries, researchers such as K.A. Abulxanova, N.V. Annenkova, A.A. Bodalev, L.A. Golovey, D.A. Leontev, S.K. Nartova, V.V. Pryadein, Z.I. Ryabikina, H. Heckhausen, M.S. Yanitskiy, and V.D. Shadrikov examined the impact of locus of control on personal activity, self-regulation, motivation, initiative in learning, and related aspects. Their studies provide an important theoretical foundation for understanding the psychological nature of locus of control.

In foreign literature, researchers such as E. Baumel, C. Dweck, D.S. Gorman, A. Caspi, H.M. Lefcourt, R. Plomin, M. Seligman, J. Rotter, D. Watson, and others analyze locus of control as a universal psychological construct associated with achievement striving, decision-making style, adaptability, and social activity. In particular, in-depth theoretical models have been developed concerning the influence of internal and external locus of control on education, professional activity, motivational systems, and psychological well-being.

The concept of "locus of control" was first introduced by the American psychologist Julian J. Rotter within the framework of social learning theory [3]. Rotter's methodological innovation lay in his departure from instinct-based psychoanalytic and drive-based behaviorist approaches dominant at the time, instead viewing individuals as conscious agents. In explaining behavior, he emphasized not only external factors but also the individual's subjective interpretation of situations. According to Rotter, human behavior is shaped not by instinctual drives but by reinforcements and expectations formed in relation to them.

The four key components proposed by J. Rotter [3]—behavior potential, expectancy, reinforcement value, and psychological situation—explain the psychological mechanism underlying an individual's decision in a given situation. Behavior potential refers to the likelihood of a specific behavior occurring, while expectancy represents the subjective probability that this behavior will lead to a particular outcome. Reinforcement value determines the significance of the outcome for the individual, and the psychological situation reflects how the person interprets the situation, which is unique for each individual.

Rotter's concept introduced a new direction in understanding human behavior: behavior is determined by both biological and social factors, but the process of subjective perception plays a decisive role. Therefore, locus of control is considered an integrative psychological construct that directly influences not only an individual's motivational system but also learning activity, academic achievement, professional competencies, and psychological adaptation.

McClelland's theory of motivation is one of the key approaches that allows for a deeper understanding of employees' internal needs and the factors driving their behavior. This theory has significant practical value for managers in identifying employees' work motivations, assigning appropriate roles, and organizing effective work processes. By determining an employee's level of achievement motivation, it becomes possible to assign roles aligned with personal goals and professional accomplishments, thereby enhancing productivity. Moreover, creating a socio-psychological environment that supports achievement motivation significantly strengthens employees' overall work engagement and intrinsic motivation. Management practices based on McClelland's model, in general, contribute to organizational stability and competitiveness.

At the same time, the achievement-oriented motivation model has several limitations. First, individuals with high achievement motivation may expect similar levels of performance from others, which can negatively affect teamwork and managerial effectiveness. Second, empirical studies supporting achievement motivation theory do not always demonstrate consistent or stable statistical results, raising questions about the model's overall reliability. Third, training programs

aimed at developing achievement motivation often require substantial time, effort, and financial resources; therefore, their effectiveness and economic feasibility require continuous reassessment. Finally, the model does not fully capture the multifaceted nature of motivation, as human behavior is influenced not only by internal motives but also by situational factors, external incentives, and social conditions. The core idea of McClelland's concept is to explain why some individuals strive for success more than others. The theory is based on two psychological mechanisms: the desire to achieve success and the motive to avoid failure. The relative dominance of these forces determines how individuals behave in specific situations. If the desire for success outweighs fear of failure, the individual is likely to engage in the task; conversely, if fear dominates, avoidance or withdrawal strategies may be chosen. From this perspective, the model is interpreted as an "approach–avoidance" mechanism. Achievement motivation theory is often regarded as a personality-oriented approach, as this motive is typically manifested as a relatively stable internal characteristic. However, interpreting achievement striving solely as a personal trait does not provide a complete picture. Situational factors—such as task difficulty, probability of success, and reward value—also significantly influence decision-making. For example, when a task is highly attractive or the reward substantial, even individuals with low intrinsic motivation may choose to engage in it.

The theory also explains why individuals with high achievement motivation tend to select challenging and complex tasks. By choosing difficult tasks, such individuals seek to enhance the value of their achievements. In contrast, individuals with low motivation prefer easier tasks to minimize the risk of failure. For instance, a highly achievement-oriented employee may choose to redesign an entire marketing campaign to increase revenue, whereas a low-motivation employee may prefer to maintain traditional work methods.

Alongside McClelland's approach, Weiner's attribution theory (Weiner, 1985) plays a significant role in explaining motivation. This theory examines how individuals explain their successes and failures. Attributions are classified along two main dimensions:

- stable vs. unstable,
- internal vs. external.

Internal attributions relate to personal ability or effort, whereas external attributions are linked to task difficulty or chance. The combination of these factors determines whether outcomes are attributed to ability, effort, task complexity, or luck. Weiner's model provides an important conceptual framework for understanding how motivation and behavioral strategies are formed in subsequent stages. The methodological foundation of this study is based on a set of modern psychological theories explaining motivational processes in human activity. The conceptual core of the research is primarily grounded in D. McClelland's achievement motivation theory, which allows for the analysis of achievement orientation, goal striving, and the psychological mechanisms of success attainment. The methodological framework also incorporates J. Atkinson's expectancy–value model, according to which the probability of engaging in a particular activity is determined by the interaction of two factors: the likelihood of task success and the subjective value of the outcome. Thus, motivation relies not only on internal needs but also on cognitive evaluation processes.

Another key methodological approach employed in this study is J. Rotter's internal–external locus of control theory, which explains how individuals perceive their level of control over life events and attribute responsibility to internal or external factors. This perspective enables a deeper analysis of the regulatory mechanisms underlying achievement motivation.

In addition, the study draws on the works of H. Murray, A. Bandura, as well as E. Deci and R. Ryan's Self-Determination Theory. This theory provides a systematic interpretation of the core sources of motivation—intrinsic interest, sense of competence, and need for autonomy. In particular, the formation of intrinsic motivation and its connection to self-development needs serves as an important methodological basis for the study.

Conclusion. This methodological platform is grounded in a person-centered approach, activity theory, and principles of motivational–cognitive integration in examining achievement striving. The processes of motivation formation, consolidation, and transformation were analyzed in relation to cognitive processes, self-awareness, and social experience. To measure achievement motivation and identify its components, a complex of methods was employed. Experimental and diagnostic methods included questionnaires, psychological tests, surveys, and observation to examine the cognitive, affective, and volitional components of motivation. Psychometric assessment utilized internationally recognized instruments such as the McClelland Achievement Motivation Test, Atkinson's Risk Preference Scale, and Rotter's Internal–External Locus of Control Scale. These methods enabled a comprehensive assessment of motivational structure, achievement striving, risk propensity, and locus of control characteristics.

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GENDER EQUALITY AND ITS PSYCHOLOGICAL ASPECTS

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Abstract. *This article examines gender equality as one of the most important issues in modern society. Human psychology and personal development are largely influenced by social expectations and stereotypes. The study also analyzes how individuals understand and realize themselves under various forms of social pressure. Special attention is paid to the psychological consequences of gender inequality and the importance of equality for personal well-being and social development.*

Keywords: *gender equality, gender roles, self-awareness, society, psychological well-being, gender stereotypes.*

Introduction

The intensity of life is changing, and society is developing rapidly. As a result, people strive to keep up with the pace of these changes. This process also applies to women. Today, the belief that women should be engaged only in housework and child-rearing, or limited to family responsibilities, is considered an obstacle to gender equality. It is emphasized that one of the most pressing issues of development is the achievement of equality, especially gender equality between men and women in society and within the family. Gender equality is regarded as one of the most important and widely discussed topics in modern society. Currently, various meetings, conferences, and discussions are being held on this issue.

Every young person has their own place in society, regardless of gender. Whether a person is male or female, everyone should have equal opportunities for self-realization. In previous periods, the situation was different. Girls were often not allowed to study or work because society believed that education was unnecessary for them. Over time, technological development and improvements in the quality of education have changed this situation.

Today, a significant proportion of university students and working professionals are women. In many universities, the number of female students is even higher than that of male students. The number of women employed in various fields is steadily increasing. The President of our country has created many opportunities for women and girls, including state grants, scholarships, and special educational loans. Gender equality and sexual equality refer to the equal rights of men and women in both family life and society, as well as equality in legal and social relations. According to some researchers, gender equality represents a transition from a patriarchal system to new socio-sexual relationships. The principle of gender equality aims to eliminate social barriers that hinder individuals, regardless of gender, from participating fully in all spheres of life and to create equal social opportunities for the personal development of both men and women.

Gender stereotypes are divided into three groups. The first group includes stereotypes of masculinity and femininity, also referred to as stereotypes of bravery and grace. These stereotypes assign certain personal qualities and socio-psychological characteristics to men and women. For example, women are often characterized as passive, dependent, and emotional, while men are described as active, independent, competent, and strong-willed. These simplified views do not

reflect the full range of individual abilities and personalities. The second group of gender stereotypes concerns the reinforcement of certain social roles in family, professional, and other areas. Women are usually associated with primary family roles, such as mother, homemaker, and wife, while men are assigned professional and leadership roles. Men are often evaluated based on their professional achievements, whereas women are evaluated according to their family responsibilities and the presence of children. The third group of gender stereotypes reflects differences between men and women in the division of labor and types of professional activity. Creative and technical professions are typically considered more suitable for men, while service-oriented and caregiving professions are associated with women. As a result, the idea of "male-specific" and "female-specific" professions has become widespread. Society traditionally assigns different roles to men and women. For example, men are expected to be strong, independent, and rational, while women are expected to be kind, emotional, and engaged in household work. These stereotypes influence the process of self-understanding. The more individuals attempt to adapt to social demands, the more their internal freedom becomes limited.

As a result, several psychological consequences may arise:

– The process of self-understanding becomes more complicated, and individuals may lose self-confidence; – Psychological stress, anxiety, and depression may increase; – Internal conflicts that hinder personal development may emerge.

Gender equality in society provides every individual with the opportunity to understand themselves freely and to develop fully. Research shows that in societies with a high level of gender equality: – Individuals have higher self-confidence; – Stress levels decrease and depression occurs less frequently; – Women and men feel like full and equal members of society. Psychologists emphasize that gender equality has a positive effect on psychological well-being. When people are free from social stereotypes, they are able to realize their desires freely. To ensure gender equality in society, the following psychological strategies are recommended: – Combating stereotypes and rejecting rigid gender role definitions when determining personal abilities and life choices; – Developing self-acceptance and self-confidence without yielding to social pressure; – Maintaining emotional balance through self-analysis and building healthy emotional relationships; – Developing a culture of equality by instilling gender-equality values in children from an early age. Gender equality is not limited to solving social problems; it also has a strong influence on psychological resilience. In societies with a high level of equality: – Women experience lower levels of stress and depression because they are free to choose their career paths; – Men become more emotionally open and strive to solve problems rather than suppress them; – Pressure related to traditional gender roles decreases, which accelerates personal development.

Psychological research shows that in environments where gender equality exists, individuals demonstrate higher emotional intelligence, manage their emotions more effectively, and build healthier interpersonal relationships. Several studies have proven the relationship between gender equality and psychological well-being. For example: – According to the World Health Organization, mental health disorders occur less frequently in countries with higher levels of gender equality; – Research conducted by Harvard University shows that as equality between women and men in the labor market increases, stress levels decrease; – In countries such as Sweden and Norway, where gender equality is high, happiness indices are observed to be higher compared to other countries.

Psychologists play a significant role in promoting gender equality by: – Providing psychological counseling free from gender stereotypes; – Conducting training sessions for parents

and children on gender equality; – Implementing special programs aimed at protecting the mental health of women and men.

Community-level initiatives conducted by UNDP demonstrate the deep impact of efforts to combat harmful gender norms:

– Equal employment opportunities: The belief that men should have more rights to work than women decreased from 60% to 30%. Moreover, 100% of male participants reported supporting the expansion of business opportunities for women, and 80% of women gained opportunities to earn their own income.

– Violence against intimate partners: The level of tolerance toward domestic violence decreased significantly. The belief that a man has the right to beat his wife decreased by 67%.

– Politics and education: Support for the idea that women should have more opportunities in politics increased from 65% to 85%. The belief that equal rights for women and men are necessary for democracy increased from 20% to 50%. Support for women's access to higher education reached 100%.

– Changes in family behavior: After the intervention, 85% of participants reported that men began to take greater responsibility for household work. In addition, 80% of participants stated that regular discussions on gender equality issues had begun within their families.

– Influence of opinion leaders: The involvement of role models, religious leaders, and public figures played a crucial role in changing attitudes toward gender equality. Engaging respected opinion leaders significantly increased public interest and support for the development of gender equality in society.

Conclusion. If gender equality is developed in society, the spiritual and psychological well-being of people will also improve. Gender equality directly influences the process of self-understanding. Equality and freedom enhance psychological well-being and overall life satisfaction. In a society where gender equality exists, individuals are able to fully realize their abilities, which leads to increased satisfaction with life. In addition, gender equality contributes to the creation of a supportive social environment in which individuals feel valued and respected regardless of gender. Such an environment encourages active participation in social, educational, and professional spheres, reduces psychological pressure caused by stereotypes, and promotes long-term personal and societal development.

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STRATEGIES FOR DEVELOPING PROFESSIONAL COMPETENCE IN PSYCHOLOGISTS OF INTERNAL AFFAIRS BODIES

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Abstract. *This article analyzes strategies for developing professional competence among psychologists of the internal affairs system. In the process of enhancing psychologists' professional potential, their motivation, training and educational activities based on an individual approach, as well as the strengthening of practical skills, play an important role. A thorough study of professional motivation ensures psychologists' readiness for complex situations encountered in service and helps increase the effectiveness of their professional activities.* Aim*: in the modern internal affairs system, the development of psychologists' professional competence is one of the most urgent tasks. The purpose of this study is to develop strategies aimed at improving psychologists' professional competence, strengthening their preparedness for practical activities, and expanding opportunities for providing effective psychological assistance during service.* In *this article, several research methods were used to study strategies for preparing psychologists of internal affairs agencies for practical activity based on the development of professional competence: analysis of literature, surveys, interviews, practice-related research, and statistical analysis. The study highlights the importance of a motivational approach in developing the professional competence of psychologists within internal affairs agencies. The results show that integrating innovative methodologies into professional development programs significantly contributes to psychologists' personal growth, strengthens their communication skills, and enhances the effectiveness of their service activities. Additionally, increasing motivation is an essential factor in reducing stressors, reinforcing professional stability, and ensuring the provision of high-quality psychological assistance during service.* The *development of professional competence among psychologists in internal affairs agencies requires a systematic approach. Enhancing professional motivation, continuously improving professional training, modernizing professional development programs, and integrating modern technologies into practical activities can significantly increase psychologists' effectiveness. At the same time, relevant organizational and methodological measures must be implemented to overcome existing obstacles in the process of developing professional competence.*

Keywords**:** *professional competence, internal affairs agencies, psychologist, motivation, professional development, practical activity, psychological assistance, advanced training.*

Introduction

In the modern internal affairs system, the issue of developing the professional competence of psychologists is of particular relevance, as this process plays an important role in achieving high effectiveness in their service activities. Improving professional competence is an approach that helps psychologists resolve various complex situations related to personal, social, and cultural aspects. Strengthening psychologists' motivation and developing approaches to enhance their

professional qualifications contribute to a deeper understanding of psychological situations arising in service activities, their accurate assessment, and the provision of effective psychological assistance.

The importance of developing professional competence in the training of psychologists of internal affairs bodies is invaluable. The development of such factors as motivation, level of professional training, individual approach, communication skills, and stress resistance in psychologists' activities plays a crucial role in increasing their service effectiveness. This article examines the main strategies for developing professional competence in psychologists, their application in practice, and their impact on social processes within the internal affairs system. This process creates opportunities to enhance psychologists' professional potential, ensure personal development, and strengthen social stability in service. In studying strategies for developing professional competence in psychologists, a number of scientific and methodological methods were used in this article:

Literature analysis: Foreign and domestic sources related to professional competence, motivation, psychological training, and the activities of internal affairs bodies were studied. This made it possible to highlight the theoretical foundations and practical aspects of improving psychologists' professional competence.

Survey method: A survey was conducted among psychologists working in internal affairs bodies to assess professional competence, motivation, and practical skills. The survey made it possible to identify psychologists' professional needs, challenges faced, and motivational state.

Interviews: In-depth interviews were conducted with psychology specialists, experienced practicing psychologists, and educators from educational institutions. During the interviews, recommendations and effective methods for improving professional competence were explored.

Practice-oriented research: The practical activities of psychologists serving in internal affairs bodies were observed. Observations helped to study real situations encountered in the process of providing psychological assistance and to identify effective approaches to addressing them.

Statistical analysis: Through statistical analysis of the collected data, the level of professional competence, motivational state, existing problems, and strategies for overcoming them were assessed.

These methods ensured a comprehensive and systematic approach to studying and recommending strategies for preparing psychologists for professional activity based on the development of professional competence. The research results confirm the important role of improving professional competence in the educational process and the necessity of applying this approach in the training of psychologists. For psychologists of internal affairs bodies, motivation and competence are closely interconnected and determine success in professional activity. Internal motives (interest in the profession, desire to help people) contribute to the formation of professional qualities, while external motives (rewards, position) provide short-term incentives. According to the Yerkes–Dodson law, professional motivation at a moderate level leads to maximum performance efficiency [1, p. 213]. However, before moving on to the study of specific facts and patterns, it is necessary to focus on these basic concepts.

The activities of internal affairs bodies involve strategic tasks such as ensuring public safety, preventing offenses, and maintaining public order. In this process, the role of psychologists is becoming increasingly significant. Internal affairs officers constantly work under conditions of stress, danger, extreme situations, and high emotional tension. Psychologists help ensure

employees' psychological stability, create a healthy team environment, prevent dangerous situations, and support rapid decision-making processes. Therefore, developing professional competence in psychologists of internal affairs bodies is of urgent and strategic importance. Professional competence of a psychologist is an integral structure that includes theoretical knowledge, practical skills, personal qualities, professional ethics, and psychological preparedness adapted to the activities of internal affairs bodies [1].

The main components of professional competence include:

Psychodiagnostic competence: The ability to assess employees' emotional states, stressful situations, and individual characteristics.

Psychocorrectional competence: Working with employees in difficult conditions, crisis intervention, and the application of relaxation and stress-reduction methods.

Communicative competence: Establishing trust-based communication, interacting with aggressive or depressed individuals, and managing conflicts.

Competence in extreme psychology: Providing psychological assistance in emergency situations and supporting employees in rapid decision-making.

Emotional-volitional stability: The psychologist's personal stress resistance and ability to maintain self-control in complex situations.

Reflective competence: Analyzing one's own activities, identifying shortcomings, and striving for professional growth.

During the training of psychologists, special modules such as extreme psychology, stress management, and negotiation psychology are taught separately. This approach facilitates the systematic acquisition of theoretical and practical knowledge. Case studies, situational exercises, role-playing games, and event modeling develop psychologists' ability to make correct decisions in real service conditions. Analyzing one's activities and drawing conclusions after each work process is an important factor in professional growth. Through debates, group analysis, training sessions, and simulations, communicative and situational management skills are improved [2].

Psychological mechanisms of developing professional competence. Formation of professional identification: Professional development accelerates once a psychologist understands their role, duties, and responsibilities within the internal affairs system [3].

Development of emotional stability: Meditation, autogenic training, mindfulness, and stress management techniques ensure psychological stability.

Strengthening communicative abilities: Communication with difficult subjects, negotiation psychology, and conflict resolution techniques are essential for professional effectiveness.

Cognitive-behavioral mechanisms: Psychologists use methods aimed at understanding clients' thinking processes, correcting errors, and shaping positive behavior.

Socio-psychological mechanisms. Mentoring and supervision: Methodological support provided by experienced psychologists to young specialists accelerates the development of professional competence.

Professional socialization: Adaptation to corporate culture, service discipline, and collective relations within the internal affairs system enhances effectiveness.

Creating a psychologically safe environment: An atmosphere of trust and open communication improves effectiveness when working with personnel.

Organizational mechanisms. Advanced training and retraining: Regular retraining and participation in seminars and trainings enable psychologists to master modern knowledge.

Regular monitoring of work effectiveness: Performance results, employee satisfaction levels, and stress indices are systematically analyzed.

Scientific and practical cooperation: Collaboration with higher education institutions, research centers, and foreign experts facilitates the implementation of innovative technologies.

The development of professional competence in psychologists of internal affairs bodies is a multifactorial, complex, and continuous process. The combined application of pedagogical, psychological, and organizational mechanisms enhances psychologists' readiness for service activities, enables effective performance in extreme situations, and ensures a healthy psychological climate within teams. High professional competence of psychologists is a key factor in the effectiveness of internal affairs bodies and in ensuring public safety.

Recommendations. Continuous development of professional competence in psychologists of internal affairs bodies is a crucial factor in improving service effectiveness. To achieve this, it is necessary to work with psychologists in a targeted manner by categorizing them, thoroughly studying their professional needs, and providing pedagogical and psychological support based on individual development plans. Regular inclusion of psychological training sessions aimed at increasing professional motivation after service exercises is recommended. In addition, organizing systematic meetings with practicing psychologists, discussing real problems encountered in practice, exchanging experience, and providing recommendations on psychological difficulties that may arise during service will further strengthen practical competence.

It is advisable to use modern diagnostic methods to study psychologists' professional motivation, personal characteristics, and service readiness. In particular, regular diagnostic monitoring should be conducted using N.G. Lusnakova's Motivation Assessment Method, A.A. Rean and V.Ya. Yakunin's Method for Studying Learning Motivation, the Maklakov–Chermyanin Adaptability Test, and the Sinyavsky–Fedoroshin Organizational and Communicative Abilities Assessment. Furthermore, continuous psychological support of internal affairs psychologists through corrective programs aimed at developing professional competence is essential. Psychological counseling, training sessions, and psychoprophylactic measures help strengthen emotional stability and eliminate negative psychological states.

Implementing regular professional development programs, teaching modern psychotechnologies, and conducting motivation-enhancing training significantly increase psychologists' professional competence. It is also advisable to deeply study psychologists' individual characteristics, work with them based on individual development plans, and regularly analyze professional activity using modern diagnostic tests. These recommendations serve to enhance professional competence among psychologists working in internal affairs bodies, ensure thorough preparation for practical activities, and expand opportunities for providing effective psychological assistance during service. Continuous attention to the development of professional competence is important not only for psychologists themselves but also for ensuring social stability and security within the overall service system.

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INTERETHNIC HARMONY AND RELIGIOUS TOLERANCE ARE THE HIGHEST VALUES OF THE UZBEK PEOPLE

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Abstract. *The article presents the attention paid to national policy in developing Uzbekistan's unique development path since the first years of independence, and the views on the legal foundations of maintaining interethnic stability in our country.*

Keywords: *interethnic harmony, harmony, international friendship, solidarity, tolerance, national experience, national development, New Uzbekistan, Development Strategy.*

Introduction

In Uzbekistan, under the leadership of the President of the country, effective measures are being implemented to strengthen the state sovereignty and territorial integrity of the Republic of Uzbekistan, further strengthen interethnic harmony and tolerance in society, preserve the ethnic and cultural identity of the peoples living in our country, and prevent discrimination regardless of gender, race, nationality, language, or religious affiliation and social origin.

Interethnic harmony is interethnic harmony, international friendship. Interethnic harmony is one of the main ideas of the ideology of national independence and is a concept that expresses the harmonious, joint, and cooperative activities of representatives of different nationalities in a certain territory or state without any conflicts. Interethnic harmony can be called the spiritual basis of mutual respect, kindness, friendship and solidarity between people of different nationalities and ethnicities living in one society and working towards a common goal. Not losing sight of common noble goals between nations is the basis for the development of ancient values.

Representatives of many nationalities and ethnicities have long lived in harmony on the territory of our country. There have been no national conflicts between them for centuries. Our people have always demonstrated such universal human qualities as tolerance, hospitality, forgiveness, respect for the traditions and values of others. Interethnic harmony is a universal value that determines the national development of regions and states where different peoples live together, and serves as a guarantee of peace and stability.

The hospitality and tolerance of the Uzbek people were especially manifested during the war years. During this period, more than 1 million people, including 200 thousand children, were evacuated to Uzbekistan. The Uzbek people treated orphans of different nationalities as their own and raised them. For example, the Shoahmad Shoahmudov family from Tashkent set a high example of humanism. During World War II, Shoahmad Shoahmudov and his wife Bahri Akramova adopted and educated abandoned and orphaned children of different nationalities.

They took in 13 homeless children of different nationalities, and after the war, 3 more children. These were: Habiba, Vova, Shuhrat - Russian, Hamidulla - Ukrainian, Rafik, Rahmatulla - Tatar, Khalida - Moldovan, Samug' - Chuvash, Yuldosh, Ergash - Jewish, Halima - Kazakh, Karavoy, Ne'mat, Muazzam, Hakima, Ulug'bek - Uzbek.

The Shomahmudov's family, as a family that glorifies humanity, showed great courage and heroism. In a multinational country like Uzbekistan, harmonizing the interests of different nations

and ensuring harmony between them is one of the decisive factors of development. After all, the future of a nation is also connected with the development of other nations and countries, the situation and opportunities in the whole world. Without peace, tranquility, stability, solidarity, and equal relations among the peoples living side by side in the whole world, first of all, in neighboring countries, none of them can ensure its bright future.

The fact that currently in our country more than 130 nationalities and ethnic groups, 16 religious confessions, and more than 2,200 religious organizations live in peace and harmony, adhering to the principles of religious tolerance, is a clear evidence of our views. In addition, some areas of the Development Strategy of New Uzbekistan are also aimed at improving harmonious interethnic relations.

One of the priority tasks of state policy in the field of interethnic relations is regular monitoring of the state of interethnic relations as a basis for early warning of possible disagreements and conflict situations in society and organizing activities to prevent them. In accordance with the Decree of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev “On approval of the Concept of State Policy of the Republic of Uzbekistan in the Field of Interethnic Relations” (No. PF-5876), adopted on November 15, 2019, the following important aspects of the field are highlighted: - “In recent years, one of the priority areas of state policy has been to ensure interethnic harmony and tolerance in society, strengthen the atmosphere of friendship and the feeling of a large multinational single family, educate young people in the spirit of love and devotion to the Motherland, respect for national and universal values, and expand cultural and educational ties with foreign countries.

At present, the issue of preserving, further developing, and enriching the national traditions and values of different nations and peoples is constantly under the attention of our state. Today, general secondary education The fact that our schools provide education in 7 languages - Uzbek, Karakalpak, Russian, Kyrgyz, Turkmen, Kazakh and Tajik, as well as the fact that the mass media operate in 10 languages of the nationalities living in Uzbekistan, are a vivid example of this.

The provisions of the Constitution of the Republic of Uzbekistan are being actively implemented in life, these provisions declare and guarantee that citizens of the Republic of Uzbekistan, regardless of their nationality, constitute the people of Uzbekistan, as well as that the Republic of Uzbekistan will treat the language, customs and traditions of the nationalities and peoples living on its territory with respect, and create conditions for their development.

In particular, Article 13 of the Constitution of the Republic of Uzbekistan states: - "Democracy in the Republic of Uzbekistan is based on universal human principles, according to which a person, his life, freedom, honor, dignity and other inalienable rights are considered the highest value." Article 19 of our Constitution states: "In the Republic of Uzbekistan, all citizens have the same rights and freedoms and are equal before the law, regardless of gender, race, nationality, language, religion, belief, social origin, or social status."

We are all proud that the rational policy pursued in our country towards ethnic harmony and religious tolerance is recognized by the world community. This, in turn, serves the peace and development of the country, the rise of universal culture and spirituality. It is no exaggeration to compare our country with many families of different nationalities and ethnicities.

The diversity of the population in Uzbekistan is a favorable factor for socio-economic development. In particular, education in state educational institutions of our country is conducted in seven languages. The National Television and Radio Company of Uzbekistan broadcasts in twelve languages, and newspapers and magazines are published in more than ten languages.

The Committee for Interethnic Relations and Friendship with Foreign Countries has 138 national-cultural centers, as well as about 2,300 religious organizations belonging to 16 confessions. We sincerely believe that these factors contribute to the development of Uzbekistan. Many of our compatriots are unaware of the existence of a center in our country that is engaged in strengthening and studying interethnic relations.

The “Baynalminal” center, founded in January 1992 by the first President of the Republic of Uzbekistan, Islam Karimov, is still operating. The meaning of the term “Baynalminal” is the Arabic translation of the word “international” and has an interethnic meaning. The task of this center is to coordinate the activities of national cultural centers operating in our country, provide them with practical and methodological assistance. Today, this cultural center coordinates the activities of about 140 national cultural centers. Our great scholars have delivered many speeches on this topic and have always amazed representatives of all nationalities with the tolerance of the Uzbek people and these beautiful qualities that are deeply embedded in our culture and identity.

In particular, Sheikh Abdulaziz Mansur, at the 2017 event on the topic of “The social significance of the tolerance and noble qualities of the Uzbek people,” emphasized that Islam is a religion of tolerance based on the idea of respect for other religions and encourages all people to be kind and compassionate, regardless of their religion. During the visit of the UN High Commissioner for Human Rights Zeid Ra'ad Al Hussein and the High Commissioner on National Minorities of the Organization for Security and Cooperation in Europe Lamberto Zannier, reforms and changes in this regard were discussed.

Highly appreciated. It is noteworthy that in 2017, for the first time in the history of independent Uzbekistan, the UN Human Rights Council Special Rapporteur on religion and belief, Ahmad Shahid, visited our country. Based on his recommendations, on May 4, 2018, the Oliy Majlis of the Republic of Uzbekistan approved the "Roadmap" for ensuring freedom of religion and belief.

In general, the international community highly appreciates the activities of our country in ensuring interethnic harmony and religious tolerance and is interested in the experience of Uzbekistan. In particular, on September 19, 2017, the President of the Republic of Uzbekistan Shavkat Mirziyoyev called for the establishment of tolerance and mutual respect, ensuring freedom of religious belief, and protecting the rights of believers at the 72nd session of the UN General Assembly. The proposal for a special resolution entitled “Enlightenment and Religious Tolerance” on December 12, 2018, the non-discrimination and the adoption of this document on December 12, 2018 are a vivid example of this. One of the important results of reforms in this regard is that in 2018, the US Department of State removed Uzbekistan from the list of “countries of particular concern” regarding religious freedom.

CONCLUSION.

In order to ensure these rights of citizens, the Committee on Interethnic Relations and Friendship with Foreign Countries was established under the Cabinet of Ministers of the Republic of Uzbekistan, which carries out its activities and consistently implements the state policy on ensuring interethnic harmony and tolerance in society.

Attention to interethnic harmony creates the basis for the nations and peoples living in Uzbekistan to engage in various professions and become aware of customs and traditions. This directly leads to the development and further enrichment of spiritual values within the nation.

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INTENSIFICATION OF THE STRUGGLE AGAINST RELIGIOUS FANATICISM, IGNORANCE AND INTERNATIONAL TERRORISM AS AN URGENT TASK OF OUR TIME

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Abstract. *The article examines religious fanaticism, social ignorance and international terrorism as interrelated threats to public security and sustainable development of modern society. Social, educational and ideological factors of radicalization are analyzed, the role of distorted religious consciousness and the deficit of critical thinking in the formation of extremist attitudes is revealed. terrorism and the need for a comprehensive approach to its prevention.*
Keywords: *religious fanaticism, ignorance, international terrorism, radicalization, extremism, prevention, public safety.*

Introduction. In the current conditions of globalization and rapid information exchange, modern society faces qualitatively new security challenges. Religious fanaticism, social ignorance and international terrorism are becoming stable and interrelated, going beyond the boundaries of individual states and affecting the foundations of the international legal order. humanitarian values.

Religious fanaticism is often the ideological basis of extremist movements, while ignorance and low levels of education create a fertile environment for the spread of radical ideas. Using these conditions, international terrorism is transforming into a global threat that requires systematic scientific comprehension.

The purpose of the study is to identify the key factors in the formation of religious fanaticism, social ignorance and international terrorism, as well as to substantiate the priority areas for their prevention in modern conditions.

Review of the studied scientific literature. Modern scientific research emphasizes that religious fanaticism is formed as a result of a distorted interpretation of religious norms and values, as well as their use for political and extremist purposes. According to a number of authors, radical movements actively exploit religious identity, replacing spiritual meanings with the ideology of violence [1].

In the reports of international organizations, including the UN and UNESCO, special attention is paid to the role of education and information policy in the prevention of extremism. It is noted that the low level of legal and cultural literacy increases the vulnerability of society to radical propaganda, especially among young people [2].

Studies on international terrorism focus on its transnational nature, the use of digital technologies and network structures [3]. Modern terrorism is characterized by a high degree of adaptability and the ability to integrate into global processes, which significantly complicates countering these threats.

Research methodology. In the course of the study, the author applies the methods of theoretical analysis of scientific publications, comparative study of international experience in countering extremism and terrorism, as well as the logical and analytical method. The empirical basis of the study consists of official reports of international organizations, regulatory documents

and the results of expert assessments. effective ways to prevent religious fanaticism, ignorance and international terrorism.

Main part. A fan is an individual characterized by uncritical and excessive adherence to certain religious, ideological or political beliefs, accompanied by intolerance of alternative views and a willingness to justify radical forms of behavior.

Fanaticism is a socio-psychological and ideological phenomenon expressed in the absolutization of individual ideas or dogmas, their elevation to the rank of unconditional truth and the rejection of the pluralism of opinions. In the religious context, fanaticism manifests itself in the distorted interpretation of beliefs, the loss of humanistic values, and the use of religion as a tool to justify violence and extremist activity, in particular:

1. Distorted religious interpretation, in which individual dogmas are taken out of context and used to justify radical ideas.

2. Low level of religious and secular education, which hinders the formation of critical thinking and conscious understanding of religious values.

3. Social marginalization and a sense of injustice, which contribute to the search for simple answers to complex social and personal problems.

4. Manipulative influence of radical leaders and propagandists who use religious rhetoric to mobilize supporters.

5. Identity crisis, especially characteristic of young people in search of meaning, belonging and social significance.

6. The information impact of extremist resources distributed through digital platforms and social networks.

Social ignorance is a combination of insufficient knowledge in the field of law, culture, history and socio-political processes, as well as a lack of skills for critical comprehension of information. It is expressed in the inability of individuals and social groups to adequately perceive social reality, which increases their vulnerability to manipulative and extremist influence.

Radicalization is a multi-stage process of the formation of extreme ideological attitudes, accompanied by an increase in intolerance of alternative views, a rejection of dialogue and, in some cases, justification or use of violence. Social ignorance acts as a catalyst for radicalization, facilitating the spread of extremist ideas in society, especially among young people.

Ignorance is one of the key factors contributing to the spread of extremist ideas. These are: Firstly, the insufficient level of education, limited access to reliable information and poor development of critical thinking create conditions for the manipulation of public consciousness. A particularly vulnerable category is young people who are in search of social identity and life guidelines.

Secondly, a significant role is played by the deficit of critical thinking skills, expressed in the inability to analyze sources of information, distinguish facts from interpretations and identify the manipulative nature of messages. In conditions of information overload, this leads to an uncritical perception of radical ideas and conspiracy theories.

Third, an important factor is limited access to reliable and high-quality information, especially in socially vulnerable groups and remote regions. Insufficient development of media literacy contributes to the spread of disinformation, pseudoscientific and extremist materials actively used by radical structures.

Fourth, socio-economic instability, unemployment, poverty and social inequality create a sense of frustration, injustice and alienation from society. In such conditions, radical ideologies are often perceived as a means of self-realization, the search for meaning, and the explanation of personal failures.

Fifth, the weakening of traditional institutions of socialization—the family, the education system, and cultural and public organizations—reduces the effectiveness of the transmission of social norms, values, and models of constructive behavior. This is especially dangerous for young people who are in the process of forming a worldview and social identity.

Therefore, taken together, these factors create a favorable environment for the formation of social ignorance, which, in turn, significantly increases the risk of radicalization and involvement of individuals in extremist and terrorist activities.

International terrorism is a form of organized violent activity carried out by transnational terrorist groups with the aim of destabilizing international and national security, exerting political, ideological or religious pressure on states and civil society, as well as intimidating the population. Unlike domestic terrorism, international terrorism goes beyond national borders, affecting the interests of the population at once several states and international organizations.

In the context of globalization, international terrorism is acquiring new features associated with the intensification of cross-border processes, the development of information and communication technologies, the growth of population mobility and the interdependence of States. Globalization contributes to the formation of terrorist networks that are able to quickly adapt to changing conditions, use digital platforms for propaganda and recruitment, and coordinate actions at the international level. This is:

First, political instability and armed conflict are a key factor, especially in regions with weak governance. Military crises, civil wars and the destruction of state institutions create a favorable environment for the activities of terrorist organizations and their transnational spread.

Second, ideological and religious radicalization plays a significant role, in which extremist interpretations of ideologies are used to justify violence and attract supporters from different countries. Terrorist organizations actively exploit issues of identity, social injustice, and cultural contradictions.

Third, the globalization of the information space is an important factor. The development of the Internet and social networks allows terrorist organizations to carry out propaganda, recruitment, and coordination of actions at the international level with minimal costs and a high level of anonymity.

Fourth, socio-economic inequality and marginalization of the population contribute to the formation of a fertile ground for radicalization. Unemployment, poverty, lack of social mobility and prospects increase the sense of alienation and protest sentiments, which are used by terrorist ideologues.

Fifthly, the lack of effective international cooperation, including incoherence among States, differences in legal systems and limited exchange of operational information, has a significant impact. This allows terrorist organizations to exploit gaps in international security.

Taken together, these factors determine the stability of international terrorism, its ability to adapt to the conditions of globalization and pose one of the most serious threats to modern world security.

Discussion. Religious fanaticism, social ignorance and international terrorism form an interrelated and self-reproducing system of threats. Social ignorance creates a fertile ground for a distorted perception of religious and ideological ideas, reducing the ability of the individual to critically comprehend information. In turn, it uses the results of these processes, transforming local forms of radicalism into transnational networks of violence, which increases the destabilizing impact on society and international security. Consequently, each of these phenomena not only strengthens the other, but also contributes to its further spread. The report of the United Nations Educational, Scientific and Cultural Organization (UNESCO) "*Preventing Violent Extremism*

through Education: A Guide for Policy-Makers" emphasizes that the key areas for preventing radicalization are the development of critical thinking, improving the quality of education, creating a culture of dialogue and tolerance, as well as strengthening the social integration of young people [4]. Supporting this approach, it should be noted that in the work **of*Bruce Hoffman*'s "*Inside Terrorism*"** emphasizes the need to combine educational, legal and socio-cultural measures to reduce the influence of radical ideology and prevent terrorist manifestations [5].

Conclusions and proposals. Thus, in our opinion, we can draw the following conclusions:

1) Religious fanaticism is formed in conditions of distorted religious consciousness and social isolation;

2) Social ignorance significantly increases susceptibility to extremist propaganda;

3) International terrorism uses the processes of globalization and digitalization;

4) Effective counteraction is possible only with an integrated and systematic approach.

In modern conditions, the priority areas for the prevention of religious fanaticism, social ignorance and international terrorism are measures aimed at eliminating their root causes and factors of spread.

First of all, it is of key importance to strengthen the role of education, focused not only on the transfer of knowledge, but also on the formation of critical thinking, legal culture and resistance to manipulative ideologies. Educational programs should contribute to the development of skills in information analysis, understanding of the diversity of cultures and worldviews, as well as the development of respect for human rights and freedoms. International experience shows that education is one of the most effective tools for preventing radicalization, especially among young people [6]. At the same time, an important area is the development of intercultural and interfaith dialogue aimed at reducing the level of social tension and preventing conflicts based on religious and ideological differences. Support for dialogue platforms, public initiatives and cultural programs contributes to the formation of tolerance and mutual understanding in society.

In addition, enhanced international cooperation, including the exchange of information, coordination of law enforcement efforts and the joint development of strategies to combat transnational terrorist threats, is a prerequisite for effective counteraction. A comprehensive combination of preventive, educational and legal measures makes it possible not only to reduce the level of terrorist activity, but also to ensure the long-term sustainability of public and international security, international cooperation in the field of prevention of extremism and terrorism.

Therefore, in particular: Education is one of the key and most effective tools for the prevention of extremism and terrorism in modern conditions. It is aimed not only at the transfer of knowledge, but also at the formation of stable value orientations, critical thinking and the ability to resist manipulative ideologies. Of particular importance is the development of a legal and civil culture that makes it possible to understand social responsibility, respect human rights and freedoms, as well as understand the consequences of extremist activity. International studies emphasize that the systematic implementation of educational programs focused on tolerance, dialogue and media literacy significantly reduces the risk of radicalization of young people and increases society's resistance to extremist propaganda [7].

The development of intercultural and interfaith dialogue is an important area of prevention of radicalization and extremism, as it helps to reduce social tension and create an atmosphere of mutual respect in society. Dialogue between different cultures, religions and ethnic groups can overcome stereotypes, prevent identity conflicts and strengthen social cohesion. Support for cultural initiatives, educational projects and public platforms for dialogue contributes to the

formation of tolerance and mutual understanding, which significantly weakens the influence of radical ideologies and reduces the likelihood of involving citizens in extremist activities.

Expanding international cooperation is a prerequisite for effectively countering extremism and international terrorism in the context of globalization. The transnational nature of modern terrorist threats requires the coordination of efforts of states, international organizations and law enforcement agencies. The exchange of information, the harmonization of legal mechanisms, joint prevention programmes and international initiatives make it possible to identify threats in a timely manner and prevent the spread of radical networks. United Nations documents emphasize that sustainable results in the fight against extremism are achieved through a combination of national measures and active international cooperation [8].

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POPULATION AND AGRICULTURAL CENSUS: UZBEKISTAN'S EXPERIENCE AND AN INTERNATIONAL COMPARATIVE ANALYSIS

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Abstract. *This article analyzes the population and agricultural census system of Uzbekistan, which will be held from January 15 to February 28, 2026. Uzbekistan's specific experience in implementing this system, statistical data and the effectiveness of the census processes are considered. The article also compares this system with international experience and recognizes the advantages and disadvantages of the census processes in Uzbekistan. The importance of the population census in the agricultural sector, its impact on economic and social development are discussed. The results of the analysis include important conclusions and recommendations that can be used in the formation of state policy and the modernization of agriculture.*

Keywords: *census, agriculture, obligation, duty, social status, statistics, demography, online, offline, mahalla seven.*

INTRODUCTION. It is widely recognized that from January 15 to February 28, 2026, a joint population and agricultural census will be conducted in Uzbekistan. It will be conducted in two stages: 17 days online (via the census.stat.uz website using OneID), and then through door-to-door data collection. The questionnaire consists of 71 questions examining demographic, social, and agricultural indicators. In this regard, the corresponding Decree of the President of the Republic of Uzbekistan No. PF-173 of September 19, 2025, "On the Population and Agricultural Census in the Republic of Uzbekistan," was approved. [1]

The goal of this program is to collect data on the demographic and socioeconomic characteristics of the population, standard of living and well-being, the state and structure of the country's agriculture, and to identify and implement priority areas of state policy for the country's socioeconomic development. Attention is paid to organizing the census process in a simple and transparent manner. The number of questions was also reduced from the previously planned 328 to 71. The census aims to create a unified database on population composition and migration, marital status, occupation, and income sources based on the recommendations of the 2020 European Conference of Statisticians.

The census process is organized in two stages: [2]

Stage One: From January 15 to 31, or 17 days, online registration will be set up on the census.stat.uz website using the OneID system.

Stage Two will be organized from February 4 to 28 through door-to-door registration of Mahalla Seven members using tablets.

The confidentiality of personal information in this questionnaire is guaranteed by law, and the information will not be shared with other agencies.

The questionnaire consists of 71 questions, 54 of which relate to population and 17 to agriculture.

LITERATURE ANALYSIS AND METHODOLOGY (LITERATURE AND METHODOLOGY/METHODS)

In Uzbekistan, the participation of local government bodies, particularly the mahalla system, alongside central government authorities, is particularly important for the effective organization of this process. The "Seven" mahalla, created in recent years, has become one of the main pillars of this process. The "Mahalla Seven" is an institutional mechanism coordinating socio-economic issues at the mahalla level and responsible for studying the needs and problems of the local population. It typically includes the mahalla chairperson, the khokim's assistant, a prevention inspector, a women's activist, a youth leader, a social worker, and individuals responsible for tax or labor issues. This composition ensures a comprehensive approach to the population and agricultural census process [1].

During the census, the mahalla "seven" performs the following key tasks:

• clarifying data on the size, composition, and migration status of the population;

• ensuring active public participation in the census process;

• preventing the entry of incorrect or duplicate data;

• creating an atmosphere of trust by explaining to the public the purpose and importance of the census.

It is well established that good knowledge of the district by members of the mahalla "seven" contributes to the reliability of statistical data. As part of the "Strengthening the Capacity of the Statistical System in Uzbekistan" project, implemented with the participation of the World Bank, employees working in the "mahalla "seven" system and other involved staff participating in the census as enumerators are provided a one-time bonus in the amount of 1.5 times the minimum wage (including taxes and other mandatory payments). The bonus payment will be financed by the National Statistical Committee based on a questionnaire completed by the relevant ministries, agencies, and civil society bodies. [1] The primary workplaces, positions, and average monthly salaries of employees participating in the census are retained. During the agricultural census, mahallas-7 serve as an important intermediary in determining household land use, livestock numbers, and the actual situation of peasant and farm households. Through direct communication with the population, they:

• determine the state of land and water resource use;

• facilitate statistical recording of informal or hidden economic activity;

• create the necessary database for developing agricultural policy in accordance with regional characteristics.

The main objectives of the census are:

1. Demographic structure – identifies key indicators such as age, gender, marital status, education, and migration.

2. Agricultural analysis – collects accurate data on land use, livestock and poultry farming, and productivity indicators.

3. Socioeconomic policy – provides significant advantages in planning sectoral strategies and the necessary social infrastructure (education, healthcare, employment).

4. Efficient resource allocation – budget funds and services are adjusted according to specific demographic needs.

5. This information creates the necessary statistical base for the effective formulation of future domestic policy and sufficiently accurate social programs.

It is well documented that Appendix 2 to Decree of the President of the Republic of Uzbekistan No. PF-173 of September 19, 2025, lists certain categories of the population for which individual ministries and government agencies organize censuses, while citizens of this Republic are also granted direct participation in the census processes and are subject to monitoring. Participants in this category are:

1. Disabled persons and elderly people without breadwinners living in the "Sahovat" and "Muruvvat" homes, orphans and children deprived of parental care living in children's neighborhoods in Tashkent, Samarkand, and Urgench. (Responsible person – National Agency for Social Protection)

2. Conscripted military personnel, military personnel called up for military service under contract, and their family members residing in closed zones, and cadets of military educational institutions. (Responsible person – Ministry of Defense, Ministry of Emergency Situations, National Guard)

3. Persons held in prisons, detention centers, pretrial detention centers, correctional facilities, and cadets of military educational institutions. (Ministry of Internal Affairs)

4. Persons held in pretrial detention centers, correctional facilities, and cadets of military educational institutions. (State Security Service)

5. Citizens of the Republic of Uzbekistan who are employees of diplomatic missions and consular offices of the Republic of Uzbekistan, as well as representatives of the Republic of Uzbekistan in international organizations, and their accompanying family members, including citizens sent by the Ministry of Foreign Affairs of the Republic of Uzbekistan to quota positions in international intergovernmental organizations. (Ministry of Foreign Affairs)

6. Citizens permanently residing in psychiatric hospitals and other medical institutions. (Ministry of Health)

7. Respondents living or studying in religious institutions (churches, mosques). (Committee on Religious Affairs) [1]

RESULTS

The impact of the Uzbek census on the population and their way of life can be divided into two types:

1. Short-term impact, which will not result in direct material benefits for registered citizens, but based on statistical data, improvements in social services, territorial infrastructure, education, and healthcare are expected.

2. Long-term impact, which includes a number of opportunities and characteristics. These include:

a) new opportunities: equitable resource distribution, labor market planning, urbanization, migration and labor strategies;

b) agricultural statistics serve as the basis for strategic support for farmers, the development of an insurance system, or grant programs.

Thus, the census will serve as a basis for socio-economic planning rather than a simple calculation.

Population and agricultural censuses are an important source of information for any country when planning its socio-economic development.

DISCUSSION: International Experience: Which countries and in which years?

• Most countries conduct population censuses every 10 years. This has been the main international practice since the 20th century.

• Some countries conduct population censuses every 5 years, such as Canada or Japan.

• Separate agricultural censuses are also conducted every 4-10 years in accordance with statistical standards (e.g., every 4 years in Germany and the Netherlands, and every 5 years in countries such as the United States and Canada).

Examples of countries:

• Argentina conducts a decennial demographic census.

• Morocco also conducts a census every 10 years.

• Indonesia also conducts demographic, agricultural, and economic censuses in designated years.

It is noticeable that Uzbekistan's decennial census is close to the international standard, and this interval is used in many countries. In some countries, participation in the census is mandatory by law, and refusal to participate or providing false information may result in legal liability (for example, in India, this is a legal requirement). In the United States, participation in the census is also mandatory, but in practice, fines are rarely imposed. Uzbekistan has not yet published official information on fines for participating in the census. Official statements emphasize that there is no need to fear the census, that the data is confidential and is used only for statistical purposes.

At the same time, participation will supplement our demographic statistics and provide a more accurate basis for government decision-making. This process is of great importance for the strategic planning of our country's socio-economic development. The census will create a unified database of 38 million people on their age, marital status, education, migration processes, employment, and sources of income. Indicators of land use, livestock, and poultry farming in agriculture will also be determined. The main goal of this event is that the collected data will serve as a primary source for the socio-economic development of regions, the creation of new jobs, improving the health of women and children, and family support programs.

In addition, the results of the population and agricultural censuses are also important for assessing the country's sustainable development goals, improving our country's position in international rankings, attracting foreign investors and increasing tourism potential [2]. The last nationwide population census in Uzbekistan was conducted in 1989. Over the past 36 years, a number of studies have been conducted in this area. However, this undertaking was postponed due to the need to study the necessary factors and international experience in conducting a full-scale census, as well as to develop appropriate measures. First, a population census is not simply a matter of determining population size, as some believe. This process involves collecting information on all aspects of the country's economic structure and social issues.

Second, it was necessary to recognize that collecting information on the economic characteristics of individuals is fundamental in this context. Thus, obtaining information on individuals is crucial for establishing work patterns, participation in the labor market, and creating an effective labor system. This required an understanding that every piece of information collected during the census allows us to study and assess the economic situation of the population. First, it is necessary to recognize that every piece of information collected during the census allows us to study and assess the economic situation of the population.

Analysis and research into historical demographic processes demonstrate that the census results create an opportunity to further strengthen our society. It also serves as a source of information for targeted regional development and the protection of women's and children's health. During the census, individual information is collected on each person, ensuring the anonymity of respondents. The census form is used only to summarize the results. Therefore, based on the results

of trials and the experience of developed countries, work is underway to abandon the paper-based registration method and conduct the census online, with the widespread use of tablet devices. The National Statistical Committee is conducting preparatory work to ensure the main event is conducted at a high and impeccable level [4].

CONCLUSION. In conclusion, it should be noted that the mahalla seven is an important institutional link in the population and agricultural census process in Uzbekistan. It serves as an effective bridge between the state statistical system and the population, ensuring the completeness, accuracy, and reliability of data. Further strengthening the activities of the seven mahallas will improve the quality of the census process and also provide a solid foundation for the development of regional development strategies. It is demonstrated that population census is not only a process for collecting statistical data but also an effective tool for shaping public policy.

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THE EARTH IN OUR HANDS

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Abstract. *This paper explores global scientific reports illustrated current environmental problems caused by pollution, climate change, and biodiversity loss. As population increasing day by day, many natural issues are appearing with huge damage consequences on the planet. For example, factories, transport and energy production polluted the air with harmful gases. As a result of this temperature of the atmosphere is increased and was a main step to the climate change. In addition, oceans are polluted, weather is changed with extreme hot or cold climate, rising sea levels and death of many animals. These environmental changes affected on human lifes as well. They influenced on peoples health, food production and economic stability. All of them are the main crucial problems of environmental crisis, because they are global and influencing not only on one specific country, but on the whole region and world as well. To prevent and solve these problems, different kind of actions are needed. For instance, our world is in our hands, it means that by changing daily habits, reducing waste and saving energy levels people can help the Earth. Government can also help by new, clear, political rules and lows which caused environmental damage. This article discuss the main responsibilities and reasons for the natural crisis and explains why collaboration between government and residents is necessary for bright future.*

Keywords*: environmental crisis, pollution, climate change, biodiversity, sustainability, responsibility.*

Introduction

Day by day, from the long times ago human activities such as air pollution, natural resources decline, climate change and death of animals have damaged the planet. People are using and wasting these resources without thinking about future and next generation, because just have a clarity about causes and solutions are essential for protecting the Earth. According to the words of Jackson (2020), humans in the current time are consuming large amount of natural resources such as oil, gas, forests and others which lead to appear serious environmental problems. Robert (2018) explains that issues such as pollution, death of animals and climate change are closely connected with each other. For example, cutting down forests leads to increasing levels of carbon dioxide in the air, as a result of this levels of hot weather are rising and because of this global warming is appearing.

The crucial illustration which people can see as a result of environmental changes are floods, heatwaves and storms happen more often. In that case, animals can not live and survive in that kind of places. That is why many species disappearing, because they just can not live in damaged environment. Huge amount of consequences show that the earth needs help now. To protect the planet and prevent fast growing levels of environmental problems, both governments and individuals should work together. For instance, government can create structured laws from

political side to protect the Earth, while individuals can reduce an important effect of their daily action without bringing drawbacks to the planet. Only by this teamwork between authorities and residents can people achieve goals of fresh and clean environment. This article demonstrates the clear causes of environmental problems and analyzes how government political rules and actions of individuals affect to addressing it.

Causes of Environmental Crisis

Global natural problems are increasing day by day. Many of these problems which are created by humans became major factors of environmental crisis. A lot of international organizations and scientists are worrying about it. Reports from IPPCC, NASA, and UNEP conducted many different ecological studies. As a result they found that major causes of todays crisis were pollution, climate change and death of animals created by human activities. Modern factories, transportation, cars, power plants and others spread out large amounts of harmful gases into the air. One main thing in this problem is that that these gases include dangerous toxins such as carbon dioxides and other chemicals that damage the atmosphere. According to the studies of Jackson (2020) illustrate that the biggest source of air pollution is burning fossil fuels for energy, which is leads to hot weather and serious changes in climate. Climate change is not just change of the nature, it causes a lot of environmental problems, which are connect with rising sea levels, storms and ice melting, All of them are appearing because day by day temperatures are rising.

But the main consequence of these issues is that they are affecting not only on humans, but also on nature life. For example, big floods destroy peoples homes and also droughts destroy lands and decline food production. Another important cause of environmental crisis is deforestation. Firstly, forests are cut down for industry, agriculture production, also it affects on animals life. They can not normally survive in their natural environments. Roberts (2018) explains that forests are important, because they can distribute fresh air, animals can live in forests because they can find new home. In conclusion, the environmental crisis has many connected causes. Pollution, climate change and environmental crisis has many connected causes of problems, which are appear as a result of human activities, and just finding them is really essential because it is the first step to protect planet and avoid damage.

Importance of Government Action

Global issues are increasing in the fast ways. They become major factors of environmental changes. To help the world, actions such as strong political laws and network between all countries around the world, residents and government are necessary to reduce dangerous emissions and protect whole environment. Government has a crucial responsibility to make right decisions which will consists of protecting and saving ecosystems. One of the most important problem nowadays is air pollution. To reduce and control levels of this problem government created new laws. These laws control emissions from different factories, cars and energy production. According to the studies of UN Climate Division (2020), show that without government policies, people will not achieve their protecting goals of the Earth. It argues that environmental problems are global, so countries must work together with clear political rules to reduce greenhouse gas emissions and decline climate change.

The GGP Network (2020) explains that cooperation work between individuals and governmental side can make best positions for achieving aims by sharing modern technologies, information and resources. From another side, authorities support environmental protection by investing in renewable energy sources such as solar panels and wind power. These energy sources reduce pollution levels. In summary, governments play a key role in environmental protection.

Through laws, teamwork between countries and policies, and investments in solutions which can help the nature, they can reduce environmental damage and protect ecosystems.

Role of Individual Action

Individuals have the main role in protection of the Earth. People can support environment by reducing waste of natural resources, declining levels of carbon dioxide and using sustainable products. Every day people are polluting the planet with daily actions, all of these actions in the result influencing on humans lives and overall wellbeing. But residents from around the world can make clear decisions to prevent dangerous problems for the nature, by working together. Roberts (2018) explains that daily habits of people strongly influenced on environmental outcomes. Daily actions can consist of recycling plastic bottles, rubbish, paper, plastic bags, many kinds of metal and old clothes also lowers pollution.

Looking at this situation Greenfield (2020) explains that these actions can help not only environment, but also make new ideas and choices to produce more eco-friendly products. From another side, humans can save energy by turning lights off, use solar panels, reduce consumption levels of water by turning off the tap while brushing your teeth. According to EcoAction (2022), small environmental changes can significantly reduce carbon emissions when many people work together. In conclusion, individuals play dominant role in protection of environment. By reducing waste, saving energy, and sustainable choices, people help protect the planet and support to achieve global environmental goals.

Combining Efforts

Real environmental changes happen when human actions and government are working together, because it will bring most effective results to protect the Earth. Government political rules provide the structure for people, people in that case can use this opportunity and add their environmental actions to realize protection of the planet. The GGP Network (2020) explains that success of environmental protection can be achieved only with responsibility. For example, recycling works when people actively recycle. Energy saving rules work better when citizens reduce electricity use. EcoAction (2022) demonstrates that environmental programs can be realized when people fully participate in these actions. On the other hand, motivation also plays a vital role to save the nature. Governments show commitment to environmental protection, people feel motivated to act. Global natural issues such as climate change require teamwork between authorities and residents from all countries around the world, because without public participation even strong political rules can be failed. In conclusion, environmental protection can not succeed only with actions from one side. Government and individuals must work together to achieve long lasting results.

Conclusion

At the current time the Earth faces a lot of ecological problems. To solve them the planet requires both individual and collective action. Only together we can achieve sustainable future. Environmental problems such as pollution, climate change, and death of animals are caused by human activities and affected everyone. This article has shown that governments and individuals have different but connected roles. For instance, government makes new political ideas and rules. Individuals can support these policies by daily actions such as recycling, reducing waste and by saving the energy. Real progress is possible only when these efforts are working together. When people and governments work together, environmental protection can be stronger. The future of the planet depends on the humans and their actions. By acting with responsibilities and supporting

political rules for environmental protection, people can help the Earth by protecting it for the next generations.

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PEDAGOGICAL AND PSYCHOLOGICAL FOUNDATIONS OF THEATRE PEDAGOGY IN PRESCHOOL EDUCATOR PREPARATION

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Abstract. *This conceptual article examines how theatre pedagogy may support the professional competence of prospective preschool educators. It integrates accounts of purposeful activity, imagination, role-taking, and experiential learning with selected empirical syntheses of drama education. The analysis distinguishes learning within a theatrical activity from transfer to professional practice. Communicative, social, creative, and reflective competence are linked to observable professional actions rather than performance fluency or confidence alone. A chart presents published effect estimates for school learners, while tables organise the proposed mechanisms, activities, and assessment indicators. Two conceptual figures connect theatrical participation with professional development and specify a cycle of rehearsal, feedback, revision, and supervised application. The article argues that professionally focused tasks and evidence-based debriefing are necessary design conditions for examining transfer. The framework is illustrated through a hypothetical preschool scenario and translated into testable propositions. No original participant data or intervention effects are reported. The contribution is a practical, assessable model for connecting theatre pedagogy with educator preparation, accompanied by explicit limits on the application of external research findings.*

Keywords: *theatre pedagogy, preschool educator preparation, professional competence, role-play, reflective practice*

Introduction

Preparing preschool educators requires more than the acquisition of theoretical knowledge. Prospective educators must communicate with children and adults, interpret emotionally complex situations, cooperate with colleagues, and adapt their teaching when planned activities do not unfold as expected. These demands make the relationship between professional knowledge and practical action a central concern in educator preparation. Theatre pedagogy offers one way to address that relationship through rehearsal, interaction, and reflection.

In this article, theatre pedagogy refers to the educational use of theatrical processes to explore experience and develop professional capabilities. It includes role-play, dramatisation, stage exercises, improvisation, pantomime, and simulations of professional situations. These activities place students in situations where meaning is expressed through speech, movement, attention, and interaction. Kolesnikova and Domnikova (2017) describe an approach grounded in improvisational play and collaborative creative activity. Applied to preschool educator preparation, this approach connects artistic expression with the practical demands of educational work.

The educational significance of theatre also has a historical and cultural dimension. Forobiy (1993) provides a philosophical context for considering education, moral development, and social life together. In the Uzbek educational reform tradition, Abdurashidxonov (1914/2013) presented theatre as a setting for instruction and self-examination. His account emphasised the

possibility of recognising human conduct and its consequences through performance. These perspectives provide a cultural rationale for educational uses of theatre; they do not, by themselves, establish its effectiveness as a professional training intervention.

The purpose of this article is to explain how theatre activities may connect professional role-taking, interpersonal understanding, and reflective action with communicative, social, creative, and reflective competence. The argument addresses a specific problem: an engaging performance can demonstrate participation without demonstrating readiness for preschool teaching. Its contribution is a framework that connects proposed learning mechanisms to observable professional actions, identifies conditions for transfer, and offers criteria through which those relationships can be examined.

Conceptual Approach

This article uses conceptual analysis to connect foundational accounts of activity, imagination, role-taking, and experiential learning with selected research on drama education and professional preparation. Historical sources provide cultural context; theoretical sources explain possible learning mechanisms; empirical syntheses delimit the strength and scope of external evidence. The selection is purposive and interpretive, rather than an exhaustive systematic review. Published summary estimates are reproduced as reported in the cited source, without recalculation, combination across reviews, or treatment as results from the present manuscript.

The unit of analysis is the relationship between a theatrical task, the learner's engagement in that task, and a subsequent professional action. Pedagogical design concerns the situation, interaction, feedback, and opportunity to revise a response. Psychological engagement concerns attention, perspective-taking, emotional regulation, and self-evaluation. Professional competence is defined as the coordinated use of knowledge, skills, and judgement in context. The analysis therefore distinguishes task participation, quality of rehearsal, and evidence of transfer to supervised preschool work.

Theoretical Foundations

Activity-oriented and developmental perspectives provide a basis for relating theatrical participation to learning. Leontiev (1977) places purposeful activity at the centre of the relationship between the individual and the social world. Davydov (1986) likewise offers a developmental perspective on the organisation of instruction. Within the present framework, these perspectives support the use of meaningful tasks that require students to interpret a situation, select an action, and consider its consequences. A theatrical task therefore needs an educational purpose that students can recognise.

Vygotsky's (1984) discussion of imagination and creativity offers a basis for considering the educational role of imagined situations. When students explore a situation beyond their immediate experience, they can examine possible actions and perspectives. The application to educator preparation is conceptual: role-play may create opportunities to rehearse a professional response, but the quality of that response depends on the task, the support available, and the student's understanding of preschool practice.

Stanislavski's (1989) account of the relationship between inner experience and external action provides a further resource for thinking about professional role-taking. In educator preparation, its relevance lies in the coordination of intention, speech, movement, and attention. This does not require students to become professional actors. It invites them to consider whether their observable behaviour communicates the educational intention they seek to express.

Moreno's (1953) work on social roles and interaction helps explain why taking another role can be useful for examining relationships. Theatre games described by Boal (2002) and improvisational practices developed by Spolin (1999) offer practical resources for organising participation and creative exploration. Kolb's (1984) experiential learning perspective links activity with reflection and subsequent action. Together, these perspectives suggest that rehearsal has educational value when experience is examined and used to inform a revised response.

Grossman et al. (2009) distinguish representations, decomposition, and approximations of practice in professional education. This distinction helps specify theatre pedagogy's professional purpose. A demonstration can make an interaction visible; analysis can isolate an aspect such as responding to a concern; rehearsal can allow a novice to attempt that practice under guided conditions. In the present framework, theatre becomes an approximation of professional practice when the task preserves a meaningful educational decision, rather than merely asking students to imitate an educator's outward manner.

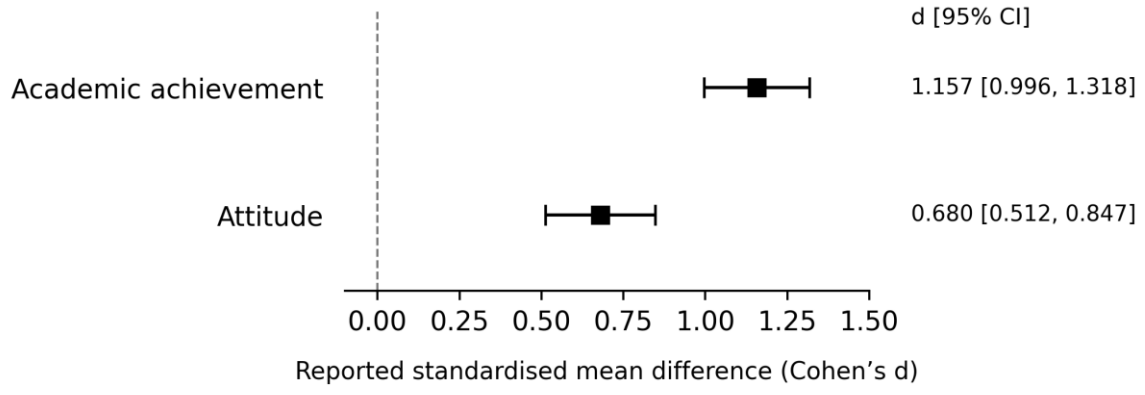
Empirical Evidence and Limits of Transfer

Lee et al. (2015) synthesised 47 quasi-experimental studies of drama-based pedagogy across PreK–16 education. They reported positive achievement findings but identified weak causal designs and limited evidence for other outcomes. This supports investigating drama as an educational approach while cautioning against treating broad classroom findings as proof of professional competence among prospective preschool educators.

Figure 1 plots the random-effects estimates reported by Yildirim (2022) for achievement and attitude in Turkish preschool and primary education. Both favour drama, but concern school learners rather than educator competence. The estimates provide context for the framework, not an expected effect of teacher preparation. Differences between these outcomes should not be read as a direct statistical comparison.

Figure 1

Published Drama Education Effect Estimates for School Learners



Note. Points show reported Cohen's d; bars show 95% confidence intervals. Values are from Yildirim (2022, pp. 25, 28). No estimates were recalculated. These are external findings, not results of the present article.

For educator preparation, the important inference is therefore conditional. Evidence that drama can support learning in a classroom does not establish that rehearsing a role changes teaching behaviour. Transfer requires a professional task, opportunities to diagnose the effects of one's

response, and observation beyond the rehearsal itself. These requirements connect the empirical context with the mechanisms examined below.

Pedagogical and Psychological Processes

Active Participation and Professional Role Taking

The pedagogical value of theatre begins with the learner's active involvement in a task. Students must respond to others, express an intention, and sustain attention to the situation as it develops. In a professional simulation, this participation can be directed towards a recognisable responsibility, such as explaining an activity to children, discussing a concern with a parent, or coordinating work with a colleague. Talyzina's (1988) account of learning provides a broader basis for attending to the relationship between organised instruction and the learner's activity.

Professional role-taking gives this activity a specific focus. Students can explore how an educator's responsibilities shape the language, pace, and manner of an interaction. The role should be defined through an educational purpose and the needs of those involved. Rehearsing a response then becomes an opportunity to examine professional judgement. The relationship between inner intention and external action discussed by Stanislavski (1989) is useful here because an appropriate intention may be communicated ineffectively through tone, gesture, or timing.

Emotional Awareness and Perspective Taking

The psychological dimension concerns the experience of acting within a role and responding to others. A student may need to recognise frustration, uncertainty, or disagreement while sustaining a constructive interaction. Perspective-taking requires attention to how the situation may be understood by another participant. Myers (1999) provides a general account of interpersonal perception and behaviour. Its relevance here is to the interpretation of professional encounters, rather than evidence that theatrical participation itself produces empathy.

Role-play can make different interpretations of the same interaction visible. A student representing an educator may experience a request as clear, while a participant representing a parent may hear it as dismissive. Discussing these interpretations can help students distinguish their intentions from the effects of their actions. Empathy, in this framework, involves attending to another person's experience while maintaining the professional responsibility to respond appropriately. It should not be inferred solely from a convincing portrayal of emotion.

Communication and Collaborative Action

Theatrical activities draw attention to verbal and non-verbal communication. Speech, pauses, facial expression, posture, and movement all influence how a message is understood. Spolin's (1999) exercises provide a practical basis for exploring attention, expression, and interaction. In preschool educator preparation, these elements can be connected to giving clear instructions, listening to children, and responding sensitively to parents and colleagues.

Collaboration is also integral to theatrical activity. Participants must coordinate their actions, notice others' contributions, and adapt when the situation changes. This provides opportunities to practise shared decision-making and constructive responses to disagreement. Yusupov (2019) emphasises discipline and responsibility in stage culture. Applied to professional preparation, these qualities can be understood as attentiveness to others, reliable participation, and responsibility for the effects of one's conduct. Their educational relevance depends on how they are connected to the responsibilities of preschool practice.

Reflection and Emotional Regulation

Reflection connects performance with professional learning. After an activity, students can examine what they intended to do, what they actually communicated, and how others responded.

Kolb's (1984) account of experiential learning supports the importance of interpreting experience before applying it to a new situation. Repeating a scene with an alternative response can make the relationship between reflection and action more concrete.

Stage exercises can also provide opportunities to practise maintaining composure, recovering after an unexpected event, and expressing ideas in front of others. Boal (2002) and Spolin (1999) offer resources for organising such exploration. The professional question is whether a student can use these capabilities while attending to a child's needs or a parent's concern. Confidence is therefore considered alongside the appropriateness of a response and the student's ability to explain or revise it.

The distinction between the pedagogical organisation of theatre activities and students' psychological engagement is summarised in Table 1.

Table 1

Pedagogical and Psychological Dimensions of Theatre Pedagogy

Dimension	Pedagogical aspect	Psychological aspect
Process	Active participation, guided rehearsal, and feedback	Emotional engagement, interpretation, and perspective-taking
Activity	Role-play, dramatisation, and stage exercises	Regulating emotion and exploring responses to uncertainty
Intended contribution	Application of professional knowledge and judgement	Self-awareness, confidence, and understanding of others

Note. The dimensions organise the conceptual argument; they are not measured results.

Professional Competence and Practical Applications

Four related dimensions of professional competence follow from the preceding analysis. Communicative competence concerns expressing meaning clearly and responding to others. Social competence concerns cooperation and the management of interpersonal situations. Creative competence concerns generating and adapting possible responses. Reflective competence concerns evaluating action and using that evaluation to improve subsequent practice. These dimensions overlap, because a professional response usually requires more than one capability at a time.

The relationship between theatrical participation and professional preparation should be considered within the wider educational context. Teshaboyeva's (2022) work on the professional motivation of prospective preschool educators connects staging and creative activity with professional preparation. Sukhomlinsky's (1979) educational perspective also supports attention to the learner as a whole person. For the present argument, these perspectives emphasise that artistic activity needs to be related to students' understanding of educational work and their responsibility towards children.

Role-play can direct attention to the interpersonal responsibilities of preschool educators. Students may rehearse an explanation, a discussion, or a response to disagreement. Dramatisation uses a text or narrative to explore motivation, character, and alternative interpretations. Improvisation and pantomime shift attention towards responding to uncertainty and communicating through movement. Simulations of professional practice combine these elements around a recognisable educational task. The practical relationship between activities, competencies, and intended applications is set out in Table 2.

Table 2

Theatre Activities and Intended Applications in Preschool Educator Preparation

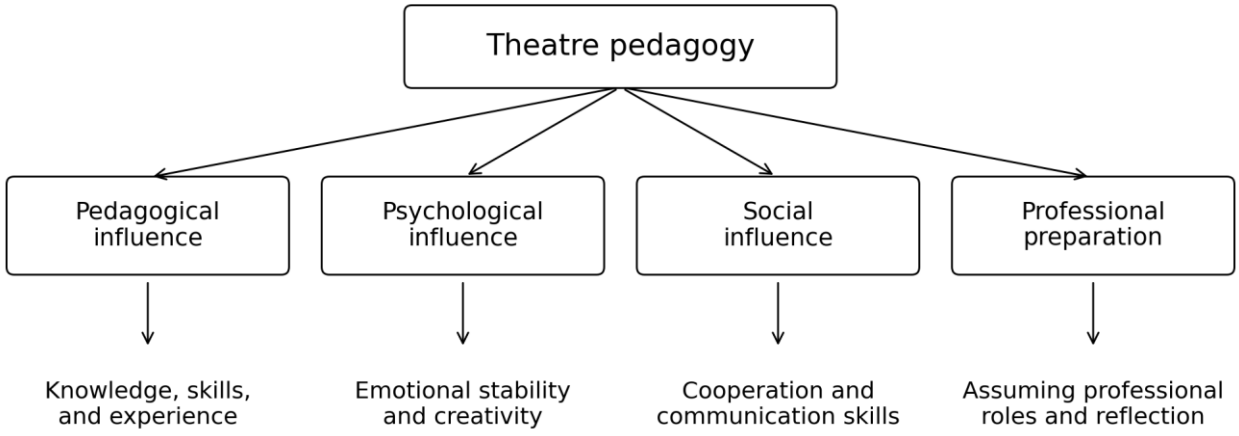
Activity	Competencies addressed	Intended professional application
Role-play	Communicative and reflective competence	Rehearse interactions with children, parents, or colleagues; examine the clarity and effects of a response.
Dramatisation	Creative and communicative competence	Interpret a narrative, express different perspectives, and consider ways to make educational content engaging.
Improvisation and pantomime	Social and creative competence	Coordinate with others, use non-verbal expression, and explore responses to unfamiliar situations.
Simulations of professional practice	Social, creative, and reflective competence	Apply theoretical knowledge to professional scenarios involving cooperation, conflict, or educational decisions.

Note. These applications are proposed uses of the activities, informed by the theoretical discussion. The table does not report evaluated intervention outcomes.

Figure 2 summarises the proposed relationships between theatre pedagogy, pedagogical and psychological engagement, social interaction, and professional preparation. These domains provide the framework's content; the rehearsal cycle presented later specifies how learning opportunities can be organised.

Figure 2

A Conceptual Framework for Theatre Pedagogy and Professional Preparation



Note. Arrows indicate proposed conceptual relationships. The framework does not represent tested causal pathways or measured changes in competence.

Implications for Educator Preparation

The framework suggests that theatre activities should begin with a clear professional learning objective. An activity intended to develop communication should identify the interaction students are practising and the features of a suitable response. A task intended to develop reflection should include opportunities to compare intention with action and to rehearse an alternative. This

connection between purpose, activity, and feedback makes the relevance of theatrical work explicit.

Structured reflection should follow participation. Discussion can focus on the educational purpose of the scene, the needs of the people represented, the language used, and the consequences of different choices. Students should be encouraged to explain the reasoning behind their responses. Feedback can then address professional judgement and communication alongside expressive performance. Artistic fluency alone should not determine the evaluation of a student's readiness for preschool work.

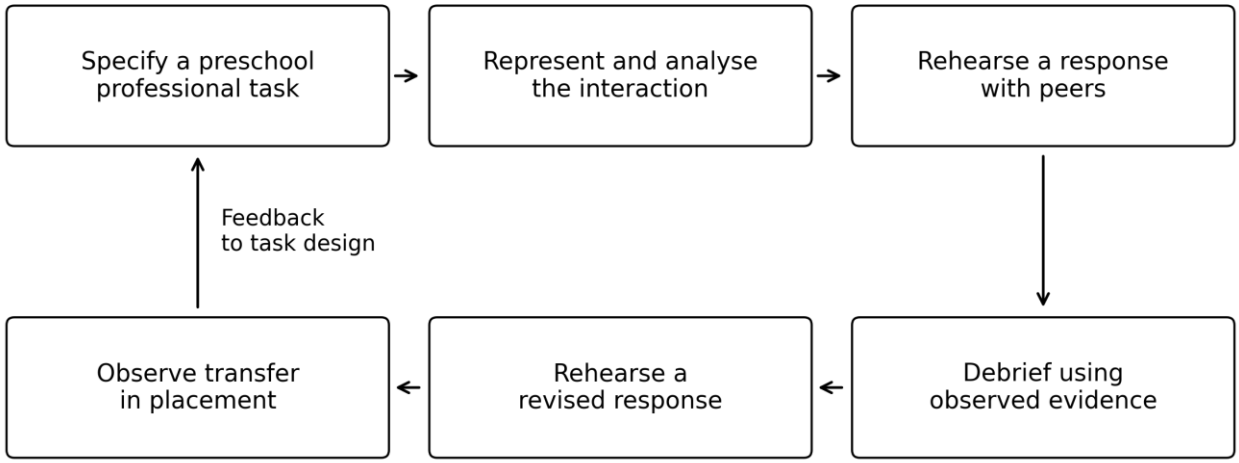
Supportive participation is also important. Students differ in their experience of public performance and their willingness to enact emotionally demanding roles. Tasks can progress from brief collaborative exercises to more complex professional simulations. Clear instructions, respectful feedback, and opportunities to observe before participating can support engagement. These are proposed design principles for educator preparation, rather than findings from an intervention evaluated in this article.

A Rehearsal Cycle for Professional Learning

Figure 3 translates the framework into a proposed instructional cycle. The educator first identifies a professional problem and makes relevant practice visible through a demonstration, account, or scenario. Students analyse a manageable aspect, rehearse a response, and use observed evidence in debriefing. They then revise the response before examining its application in supervised placement. Placement observations feed back into the selection of further rehearsal tasks. The sequence links experience and reflection (Kolb, 1984) with practice-focused preparation (Grossman et al., 2009).

Figure 3

A Rehearsal and Transfer Cycle for Preschool Educator Preparation



Note. Author-developed model informed by Kolb (1984) and Grossman et al. (2009). Arrows show a proposed sequence and feedback, not validated effects.

Assessment and a Worked Example

Assessment should separate a student's willingness to participate from the quality of professional judgement demonstrated. Table 3 offers observable indicators for the four competence

domains. The same indicator should be examined in rehearsal and in a different placement situation, because repeating a familiar scene can conceal dependence on a script. Feedback should identify specific behaviour and the reasoning behind it. These criteria are proposed for formative use and require validation before high-stakes assessment.

Table 3

Proposed Indicators for Assessing Rehearsal and Professional Transfer

Competence	Observable indicator	Evidence during rehearsal	Evidence of transfer
Communicative	Explains an intention clearly and responds to the other person.	Uses an open question and checks understanding.	Adapts an explanation to a new child or parent interaction.
Social	Coordinates action and responds respectfully to disagreement.	Acknowledges a concern and negotiates a next step.	Cooperates with a colleague in a different classroom situation.
Creative	Generates an appropriate alternative while preserving the educational aim.	Revises an activity after an unexpected response.	Adapts a planned activity to an unfamiliar classroom constraint.
Reflective	Uses specific evidence to explain and improve a decision.	Identifies an ineffective response and rehearses a revision.	Explains how feedback informed a later decision in placement.

Note. Proposed assessment guide. Validity, fairness, and inter-rater reliability require empirical evaluation.

Consider a hypothetical rehearsal in which a parent questions why a child is expected to participate in a group dramatisation. The student educator's task is to understand the concern, explain the activity's purpose, and offer a suitable form of participation. An observer records the questions asked, the explanation given, and the response to disagreement. Debriefing examines these actions rather than judging whether the student appeared convincing in the role. A revised rehearsal can introduce a new constraint, such as the child preferring to observe. Transfer would require evidence that the student responds appropriately to a different concern during supervised placement; success in this invented scenario alone is insufficient.

Propositions for Empirical Examination

Three propositions make the framework open to testing. First, professionally specific rehearsal with feedback should produce more context-sensitive responses than an equally engaging activity without a professional decision. Second, evidence-based debriefing should improve the quality of a revised response more than repetition alone. Third, gains in self-reported confidence may differ from gains in observed professional judgement. Each proposition requires comparison across conditions and assessment beyond the rehearsed scene.

Limitations and Directions for Research

This article develops a framework and an assessment proposal; it does not validate either through original participant data. External drama-education findings concern different learners,

tasks, and outcomes, and cannot be converted into an effect estimate for preschool educator preparation. The source selection is interpretive and may omit relevant or contradictory research. The proposed indicators also require investigation of fairness, reliability, and their relationship to professional behaviour before use for consequential decisions.

A suitable evaluation would compare a professionally focused rehearsal programme with an active comparison offering similar time, attention, and collaboration. Assessment should combine baseline, post-programme, and follow-up observations, use unfamiliar but comparable tasks, and distinguish confidence from performance. Independent assessors should apply shared criteria and report agreement. Where feasible, assessors should be unaware of programme allocation. Evidence from supervised placement is needed to examine transfer; child outcomes would require a separate evaluation with an appropriate design. These steps would test the propositions without assuming that an attractive theatrical performance establishes teaching competence.

Conclusion

Theatre pedagogy can provide a structured setting for rehearsing the relational and adaptive demands of preschool teaching. Its professional value depends on the educational decisions preserved in the task, the evidence used in debriefing, and the opportunity to revise and apply a response. This article connects those conditions with communicative, social, creative, and reflective competence, offers observable assessment indicators, and specifies a rehearsal-to-placement cycle. Published classroom findings motivate further investigation, while direct evidence of transfer remains necessary. The resulting framework supports the design and evaluation of theatre-based preparation without treating engagement, confidence, or performance fluency as substitutes for professional judgement.

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PEDAGOGICAL SITUATIONAL TASKS AS A MEANS OF DEVELOPING FUTURE TEACHERS' COMPETENCE IN USING ARTIFICIAL INTELLIGENCE

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Abstract. *The article addresses the problem of preparing future teachers to use artificial intelligence (AI), a problem that is also significant for secondary vocational education, where teachers shape learners' first professional habits of working with AI. The aim is to substantiate a system of pedagogical situational tasks as a means of developing competence in using AI. The competence is viewed as an integrative professional quality comprising cognitive, operational-activity, motivational and reflective components. A 24-hour course is described in which every task is completed in three steps: verifying the AI output, comparing it with one's own solution, and justifying the choice from pedagogical and ethical standpoints. A quasi-experiment involving 281 students from three pedagogical higher education institutions in Uzbekistan showed that students in the experimental group chose the justified decision in 66.0% of situations versus 45.5% in the control group (Hedges' g = 0.741). Recommendations are proposed for applying the system in the training of secondary vocational education teachers.*

Keywords: *artificial intelligence, future teachers, competence in using artificial intelligence, pedagogical situational tasks, teacher education, secondary vocational education, quasi-experiment.*

Introduction

Generative artificial intelligence (AI) has entered everyday educational practice faster than teacher education programs have been able to prepare for it. Learners in schools and vocational colleges already use chatbots and text generators to complete assignments, and teachers are expected not only to use these tools themselves but also to teach learners to use them consciously and responsibly. The AI competency framework for teachers proposed by UNESCO describes five dimensions – from a human-centered mindset and the ethics of AI to AI pedagogy and professional development – and three levels of mastery [1]. The OECD has designated media and AI literacy as the innovative domain of PISA 2029 [2], which makes developing this literacy among young people a task for the near future.

This task is of particular importance for secondary vocational education. Future specialists will work in settings where AI tools are becoming part of professional activity, and it is the college teacher who shapes their first professional habits of handling these tools: verifying the output, understanding its limitations, and taking responsibility for the decision made. Pedagogical universities train specialists who will work both in general secondary schools and in vocational education institutions; therefore, how future teachers learn to handle AI also determines how their learners will handle it.

Meanwhile, a review of research on AI literacy in teacher education shows that the topic remains underexplored and that existing studies more often describe technical knowledge than

teachers' professional decisions [3]. Widely used models of AI literacy are oriented primarily toward the AI user [4], whereas the Intelligent-TPACK model emphasizes that teachers need knowledge about the ethically sound integration of AI tools into teaching [5]. The question of which didactic means can develop such professional and ethical readiness in future teachers remains open.

The aim of the study is to substantiate a system of pedagogical situational tasks as a means of developing future teachers' competence in using AI and to test its effectiveness experimentally. The objectives of the study are: (1) to clarify the content and structure of the competence; (2) to develop a system of situational tasks and a course in which it is implemented; and (3) to compare the outcomes of students who did and did not complete the course.

Methods

Theoretical framework. Drawing on the understanding of competence as an integral educational outcome manifested in activity [6] and on the view of competence as a continuum from dispositions through situation-specific skills to observable performance [7], we define a future teacher's competence in using AI as an integrative professional quality that enables the teacher to select an AI tool in accordance with a pedagogical goal, to critically verify the resulting output, and to pass this experience on to learners. The definition combines two roles of the teacher: that of an AI user and that of someone who teaches others to use it.

Four components are distinguished in the structure of the competence: cognitive (knowledge of the capabilities, limitations and risks of AI), operational-activity (the ability to use AI in preparing learning materials and to adapt the output to a specific group of learners), motivational (readiness for the responsible use of AI and recognition of human responsibility for pedagogical decisions) and reflective (evaluation of one's own decisions and of their pedagogical and ethical consequences). Each component is described by observable indicators at three levels: at the reproductive level, the student relies on a ready-made rule; at the productive level, the student transfers the situation to their own pedagogical context; and at the creative level, the student justifies the choice from pedagogical and ethical standpoints and designs a new solution.

System of pedagogical situational tasks. The key means of developing the competence was the course “Artificial Intelligence in the Professional Activity of a Teacher” (24 academic hours: 10 hours of lectures and 14 hours of practical classes covering 8 topics). The course is built not around individual tools but around professional situations in which the teacher must decide whether AI can be relied upon, how to verify its output and what to explain to learners. This choice is consistent with the view of ill-structured, context-rich problems as a means of developing the ability to make and justify decisions [8].

Each pedagogical situational task is completed in three steps:

1) verifying the AI output – identifying factual errors, inaccuracies, bias or inappropriate content in a text, plan or answer generated by AI;

2) comparing with one's own solution – completing the task independently or refining the AI output, and identifying what the teacher's solution adds;

3) justifying the decision – choosing the final course of action and explaining it from pedagogical and ethical standpoints, including what learners should be told about the role of AI.

The three-step structure targets the main risk noted by researchers of the use of large language models in education – uncritical trust in AI output [9]. In addition, it makes the student's reasoning visible and therefore assessable.

Example. A teacher asks a chatbot to compose five questions to check comprehension of a textbook passage. Two of the questions concern information that is not in the text, and one requires knowledge the learners have not yet acquired. In the first step, the student detects these shortcomings by checking the questions against the text; in the second, the student writes their own questions and compares them with the AI version; in the third, the student decides which questions to use and formulates how to explain to learners why AI-generated materials must always be checked against the source.

The tasks become more complex as the course progresses, in line with the three competence levels and the three course modules (Table 1). Each task is followed by an analytical discussion in which the instructor and the students examine the grounds for their choices, typical errors and next steps. This turns assessment results into feedback that shows students where they are, where they are going and what to do next [10].

Table 1

Pedagogical situational tasks by course module

Course module (hours)	Level	Typical task
I. Values and ethics of AI use (4 h)	Reproductive	Identify the risks of using AI in a situation (errors, bias, privacy, academic integrity) using a given checklist
II. Conceptual knowledge and technical practice (10 h)	Productive	Verify and refine AI-generated learning material for a specific subject and group of learners
III. Pedagogical application and professional development (10 h)	Creative	Design a task in which learners themselves use or verify AI, and justify its pedagogical and ethical appropriateness

Organization of the experimental work. The experiment followed a quasi-experimental nonequivalent control group design and was conducted at the Nizami National Pedagogical University of Uzbekistan, Jizzakh State Pedagogical University and Termez State Pedagogical Institute. The experimental group (EG) comprised 141 students who completed the course, and the control group (CG) comprised 140 students who followed the regular curriculum. Participation was voluntary, and responses were collected anonymously via an online form.

Before the course, a baseline assessment was conducted that evaluated students as AI users. The final assessment evaluated students as future teachers who teach the use of AI; it comprised 28 professional situational tasks, each with three courses of action, one of which reflected a pedagogically and ethically justified decision. Total scores (0–28) were converted into grades on the national five-point scale corresponding to the competence levels: 0–4 – “2” (not developed), 5–9 – “3” (reproductive level), 10–19 – “4” (productive level), 20–28 – “5” (creative level). The internal consistency of the final assessment was high (Cronbach's $\alpha = 0.934$). Since the two assessments measure different roles, their results were not compared with each other; only the EG and CG were compared.

The groups were compared using linear regression of the final score on group membership controlling for institution, Hedges' g effect size, the Mann–Whitney U test, and the χ^2 test with Cramér's V; the homogeneity of the effect across the three institutions was assessed with the Q statistic.

Results

In the baseline assessment, the mean grade was 3.98 in the EG and 3.80 in the CG; the grade distributions did not differ significantly ($\chi^2(3) = 6.533$; $p = 0.088$), i.e., no initial differences between the groups were detected.

After the course, EG students chose the justified decision in 66.0% of situations (a mean of 18.48 out of 28 points), and CG students in 45.5% (12.73 points) (Table 2). Controlling for institution, the difference was 5.75 points ($p < 0.001$), with an effect size of Hedges' $g = 0.741$, which corresponds to an above-medium effect. The result was confirmed by the nonparametric test ($p < 0.001$; $r = 0.34$).

Table 2

Results of the final assessment

Indicator	EG (n = 141)	CG (n = 140)	Statistics
Mean score (out of 28)	18.48	12.73	B = 5.75; p < 0.001; g = 0.741
Share of justified decisions, %	66.0	45.5	Mann–Whitney U test: p < 0.001; r = 0.34
Grade “5” (creative level), %	51.1	20.7	$\chi^2(3) = 37.014$; p < 0.001; V = 0.363
Grade “2” (not developed), %	1.4	14.3	

Note: B – regression coefficient for group membership controlling for institution; g – Hedges' g; V – Cramér's V.

The grade distributions differed significantly ($\chi^2(3) = 37.014$; $p < 0.001$; $V = 0.363$). The creative level was reached by 51.1% of EG students and 20.7% of CG students, i.e., about 2.5 times as often; the proportion of students with undeveloped competence was 1.4% and 14.3%, respectively (Fig. 1).

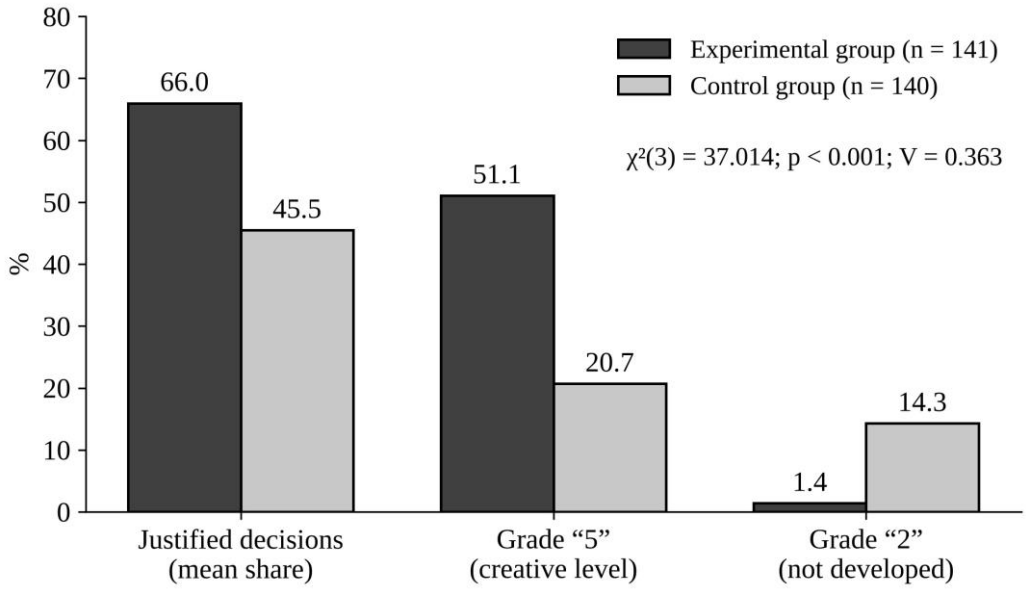


Fig. 1. Results of the final assessment in the experimental and control groups, %

The effect was significant at each of the three institutions ($g = 0.683$–0.781; $p < 0.01$) and did not differ between them ($Q(2) = 0.123$; $p = 0.940$). When the baseline score was included in

the model as a covariate, the effect estimate changed only slightly (g = 0.731). Some CG students scored below the chance level (38.6% versus 17.0% in the EG), indicating lower engagement in completing the test; when students with undeveloped competence were excluded, the effect decreased but remained statistically significant and medium in size (d = 0.58; 95% CI [0.33; 0.83]; $p < 0.001$).

Discussion

The most noticeable difference between the groups is observed at the top of the scale: half of the EG students consistently chose decisions that combined verification of the AI output with pedagogical and ethical justification. This is consistent with the design of the tasks: the three-step "verify – compare – justify" structure trains precisely the professional judgment required in the final assessment. The result agrees with the findings of research on preparing pre-service teachers to use technology, which identifies reflection, designing one's own tasks, authentic situations and feedback as key conditions for effectiveness [11], as well as with the position of the UNESCO framework, which singles out AI pedagogy as a distinct dimension of teacher competence [1]. Unlike models that describe only the AI user [4], the proposed system develops both roles of the teacher from the very first session.

The results are of practical significance for secondary vocational education. The "verify – compare – justify" logic does not depend on the subject and can be transferred to the training of teachers of vocational subjects and instructors of practical (industrial) training: in professional settings, an AI error in a technical calculation, an instruction or a regulatory requirement may have not only educational but also practical consequences. Situational tasks built on material from learners' future occupations enable college teachers to develop in them the habit of verifying AI output even before they begin working independently. Such adaptation requires separate testing; however, the organizational principles of the course – paired tasks for both roles of the teacher, progression from following a rule to designing a solution, and an analytical discussion after each task – are applicable in this context as well.

The findings should be interpreted in light of several limitations. The groups were formed from existing student groups rather than by random assignment; the baseline assessment had low internal consistency, so the initial comparability of the groups is supported only by the absence of detected differences; and the final assessment also served as the final test of the course, which may have given the EG the advantage of familiarity with the task format. The experiment was conducted with students of pedagogical universities; therefore, extending the results to the training of secondary vocational education teachers requires further research.

Conclusion

The system of pedagogical situational tasks, built on the "verify – compare – justify" sequence and increasing in complexity from the reproductive to the creative level, can be regarded as an effective means of developing future teachers' competence in using AI: in an experiment involving 281 students from three pedagogical higher education institutions, students who completed the course made justified decisions in professional situations considerably more often (66.0% vs. 45.5%; g = 0.741), and the effect was replicated at all three institutions.

Practical recommendations: (1) include the 24-hour course in teacher education programs as an elective subject or module; (2) combine in every task the role of the AI user and the role of the teacher who teaches its use; (3) conclude each task with an analytical discussion of reasoning, not only of results; (4) in pre-service and in-service training programs for secondary vocational education teachers, build situational tasks on material from the relevant occupations. Future

research will involve testing the system with a sample of vocational college teachers, randomized designs and delayed measurements.

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