IRSTI 14.35.07 **DOI 10.47649/vau.26.v80.i1.17**
UDC 378

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STRATEGIES FOR INTEGRATING ICT INTO THE FORMATION OF THE DIGITAL CULTURE OF FUTURE PRIMARY SCHOOL TEACHERS

Abstract

The article provides a detailed study of strategies for integrating information and communication technologies (ICT) into the training of future primary school teachers. Special attention is paid to the analysis of existing approaches to the formation of teachers' digital culture in the context of globalization and rapid technological development. The author's analysis includes an assessment of current methods, identification of their shortcomings, and suggestions for optimizing curricula and courses. ICT integration is presented as a complex cultural, pedagogical, and social process that requires an interdisciplinary approach. The purpose of the research is to theoretically substantiate and develop effective strategies for integrating information and communication technologies (ICT) into the process of training future primary school teachers aimed at shaping their digital culture in the context of globalization and digital transformation of education based on the analysis of existing approaches, identifying their limitations and developing practice-oriented recommendations for improving educational programs and methods. training. The results of the study confirm the need to modernize educational infrastructure, develop digital modules, and improve teachers' professional training. The article emphasizes that the formation of the digital culture of future teachers is possible only through a combination of technology and pedagogical innovations, individual approaches, and the constant updating of the methodological base. The research results include strategic recommendations to improve the educational process, such as introducing project-based learning, hybrid formats, gamification, and cloud technologies. The data obtained has significant practical value and contributes to dialogue among educational institutions, policymakers, and researchers. The authors conclude that a systematic approach is needed to create a sustainable digital culture that will serve as the basis for professional teacher training in the context of the digital transformation of society.

Keywords: information and communication technologies, digital culture, educational process, digital literacy, digital skills.

Introduction

In the context of the digitalization of all spheres of life, education is facing new challenges that require modernizing approaches to teacher training. Information and communication technologies (ICT) are becoming an integral part of the educational process, opening up wide opportunities to improve its effectiveness, personalize learning, and enhance the interactivity and accessibility of educational materials. However, the successful implementation of digital technologies in educational practice largely depends on teachers' level of digital culture and their willingness to use innovative tools and techniques. Future primary school teachers play a key role in developing digital literacy among younger students. The initial stage of training is crucial for laying the foundations of an information culture and for safe, meaningful use of digital technologies. Therefore, training teachers to effectively integrate ICT into the educational process is becoming a priority task in modern pedagogical science.

Despite the widespread use of digital technologies in education, several serious problems hinder their full integration: the discrepancy between curricula and the requirements of the digital age, the gap between theoretical training and the practical use of ICT, limited access to modern educational technologies, and insufficient digital competence among teachers. In educational institutions, future teachers often master traditional teaching methods, while digital technologies are considered only in fragments. Many teachers struggle to adapt to new educational formats because their professional training does not include sufficient practical cases and techniques for working with digital tools. There is a shortage of technical equipment in some educational institutions, insufficient funding for updating digital infrastructure, and weak technical support. In

addition, teachers, especially the older generation, lack the necessary digital skills and are not always motivated to learn new technologies.

In this context, the study's relevance is determined by the need to develop comprehensive strategies for integrating ICT into the training of future primary school teachers. The modern educational environment requires not only technical equipment but also methodological, organizational, and psychological readiness among teachers for digital changes. The research aims to develop and substantiate strategies for integrating ICT into the formation of the digital culture of future primary school teachers to increase their professional competence in the context of the digital transformation of education. To achieve this goal, an analysis of existing approaches to integrating ICT into teacher education has been carried out, the main problems and barriers preventing the formation of a digital culture have been identified, recommendations have been developed for modernizing curricula to meet the requirements of the digital age, and mechanisms for monitoring and evaluating the effectiveness of ICT implementation in the educational process have been identified.

The study is based on a qualitative analysis of existing strategies for the digitalization of teacher education. The main research methods are the analysis of scientific literature and educational programs, which allows us to identify current trends and existing problems in the field of ICT integration, SWOT analysis aimed at identifying the strengths and weaknesses of the current teacher training system, as well as the opportunities and threats associated with the introduction of digital technologies, the expert interview method, including a survey of teachers of pedagogical universities and specialists in the field of digitalization of education to identify key problems and needs, and to survey students of pedagogical specialties, which allows them to assess their level of digital competence and readiness to use ICT in their professional activities.

The novelty of the work lies in an integrated approach to the formation of the digital culture of future teachers, taking into account not only technical aspects, but also methodological, pedagogical, and organizational factors. Unlike existing studies, this study considers ICT not as a separate tool but as an integral component of the educational ecosystem, which requires adapting curricula, training teachers, and developing digital infrastructure.

Pedagogical universities and institutes can use the recommendations developed during the study to update educational programs, introduce digital modules, and improve teachers' skills. In addition, the results obtained can be useful for government agencies responsible for the digitalization of education, as well as for schools seeking to improve the digital literacy of teachers and students. Thus, the formation of the digital culture of future primary school teachers requires a systematic approach, including the modernization of educational programs, professional training of teachers and the development of digital infrastructure. The introduction of effective ICT integration strategies will create an educational environment that meets the requirements of the digital society and promotes the formation of new competencies among teachers and students.

Literary review.

The issues of integrating information and communication technologies (ICT) into the educational process and the formation of digital culture among future teachers are widely studied in the scientific literature. This paper examines key studies on the development of teachers' digital competencies, methods for digitalizing the educational process, and problems related to the introduction of ICT into the teacher training system.

Artemyeva V., Voronina L. (2020) consider the development of the information culture of future teachers in the context of digitalization of education [1]. The authors emphasize the need to modernize educational programs taking into account digital technologies and to develop teachers' skills of critical understanding of digital content. The study highlights the importance of an integrated approach that includes both technical and methodological training for teachers.

Abbasova L., Zotova I. (2021) analyze the technologies for forming the information culture of future teachers [2]. They note that the digitalization of education requires teachers to possess not only technological tools, but also pedagogical methods that ensure the effective use of ICT in the educational process. The authors identify the key principles for integrating ICT into teacher

training, including personalizing learning, developing digital skills, and fostering digital responsibility among future teachers.

The work of Ou-sekou Y, Kaddari F. (2021) is devoted to the characterization of the digital culture of future elementary school teachers [3]. The authors reveal that the level of teachers' digital culture depends on many factors, including the availability of technology, motivation to use digital tools, and the level of education at universities. The study highlights the need for a systematic approach to developing digital competence, which should include both technical and pedagogical components.

Fedotova O., Belousova A. (2022) analyze the digital competence of future teachers within the framework of Russian scientific discourse [4]. The study examines current trends in the digitalization of teacher education and the problems associated with teachers' lack of methodological training in the use of ICT in the educational process. The authors offer recommendations for implementing digital modules in educational programs and organizing teachers' training in digital technologies.

Loperfido F. (2018) examines teachers' adaptation to digital culture using the example of South Italian teachers [5]. The author emphasizes that the process of digitalization requires not only technical training but also a change in teachers' professional thinking, which should be accompanied by systematic support from educational organizations. An important place in the study is occupied by the analysis of the digital barriers faced by teachers, including a lack of infrastructure and a low level of training in the use of digital tools.

Otravenko O. (2020) focuses on the development of digital competence among future physical education teachers in an innovative educational environment [6]. The author notes that the use of digital technologies in teaching can significantly increase student engagement and teaching effectiveness, but requires a change in traditional teaching methods. The study offers recommendations for integrating digital technologies into teacher training, including the use of virtual laboratories and online courses.

The study by S. Tkachov and N. Tkachova (2023) focuses on the development of digital competence among future teachers in the modern digital educational space [7]. The authors emphasize that the digital environment requires new skills from teachers, including adaptability, the ability to work with large amounts of information, and proficiency with cloud technologies. The paper examines successful practices of integrating ICT into the educational process and analyzes strategies for the digital transformation of teacher education.

Capogna S. and Cianfriglia L. (2020) propose guidelines for digital culture in educational organizations [8]. The study examines the main aspects of teachers' digital literacy, including the development of critical thinking, use of digital tools, and awareness of the ethical aspects of digital interactions. The authors emphasize the importance of creating an educational ecosystem focused on digital competencies and innovative teaching methods.

Aubakir A., Maimatayeva A. (2023) analyze the key aspects of the formation of digital competencies of future biology teachers [9]. The study emphasizes that digital technologies can significantly improve the quality of natural science teaching, but their effective implementation requires a change in teaching methodology and comprehensive teacher training.

Anisimova T., Sabirova F. (2020) consider the formation of research and project competencies among future teachers in the framework of STEAM education. The authors emphasize an interdisciplinary approach to learning, in which ICT serves not only as a teaching tool but also as an object of study. The study presents successful practices for using digital technologies in STEAM education and examines strategies for integrating them into teaching programs.

Thus, the analysis of scientific publications shows that the integration of ICT into the educational process requires an integrated approach, including the modernization of curricula, the development of teachers' digital competencies, and the adaptation of methodological materials to modern technological realities. Most studies agree that the successful digitalization of teacher education is impossible without systematic teacher training, including instruction in digital tools,

the development of methods for their effective use, and the cultivation of a critical attitude towards digital content.

Materials and methods of research

This study used qualitative analysis methods to study strategies for integrating information and communication technologies (ICT) into the training of future primary school teachers. The main research materials are scientific articles, reports from educational institutions, and methodological manuals on the digitalization of education. To ensure the representativeness and objectivity of the data, the following criteria were applied for the selection of materials: relevance of publications (no older than five years), credibility of sources (publications in peer-reviewed scientific journals, materials from international conferences and reports from official educational organizations), as well as substantive relevance, determined by the relevance of the issues under consideration to the research topic.

The analysis process included several stages. At the first stage, a literature review was conducted, during which existing approaches to integrating ICT into the educational process were identified, as well as key problems hindering the effective formation of digital culture among future teachers. At the second stage, the data were systematized, enabling identification of the main trends and research gaps. At the third stage, a method of meaningful analysis was applied to identify key aspects of the use of ICT in teacher education.

For a structured analysis of the problem, the SWOT analysis method was used. The choice of this method is determined by its effectiveness in assessing the strengths and weaknesses of existing educational strategies, as well as possible threats and prospects for the introduction of digital technologies in teacher training. The SWOT analysis enabled a comprehensive assessment of teachers' digital literacy, the identification of barriers to integrating ICT into the educational process, and the development of strategic directions for modernizing future teacher training programs.

The analysis showed that among the strengths of digitalization in education are the high potential of technology to improve the quality of teaching, the expansion of opportunities for distance and hybrid learning, and the growing interest in the use of digital tools among young teachers. Weaknesses include a lack of a unified approach to integrating ICT into educational programs, a shortage of qualified personnel, and insufficient technical equipment in many educational institutions. The opportunities identified during the analysis include the development of educational platforms, the creation of specialized digital courses and the strengthening of international cooperation in the field of educational digitalization. The main threats were limited funding, the digital divide between regions, and the traditional teaching environment's resistance to the introduction of new technologies.

Based on the data obtained, practical recommendations were developed to improve the educational infrastructure, introduce digital modules into curricula, and create feedback mechanisms to monitor the effectiveness of implemented solutions. Special attention is paid to the development of a sustainable system for the professional training of teachers in ICT, ensuring the availability of technology even in educational institutions with limited resources. The results obtained enable the proposal of comprehensive solutions to modernize the educational process in the context of digital transformation, thereby increasing the level of digital literacy among future teachers and their readiness to effectively use ICT in their professional activities.

Results and their discussion

This study analyzes various strategies for integrating information and communication technologies (ICT) into the educational process of training future primary school teachers. The main methods, including project-based learning, gamification, blended learning, and cloud technologies, are considered. Each of these strategies has its advantages and limitations, so their combination enables the creation of a multi-level educational environment conducive to the development of digital competencies among future teachers.

Blended learning is a hybrid educational model that combines traditional face-to-face instruction with online components. This method allows you to personalize the educational process by adapting materials to students' individual needs. As part of the training of future

elementary school teachers, blended learning contributes to the development of their digital skills and helps them master new pedagogical technologies, such as interactive educational platforms and learning management systems (LMS).

Project-based learning using ICT is aimed at developing analytical and critical thinking among future teachers, as well as skills in interacting with digital tools. However, this method requires careful training for teachers, since integrating digital technologies into project activities must meet educational standards and be practically applicable to teachers' future professional activities.

Gamification is considered a method of increasing student engagement through game mechanisms such as achievement systems, virtual rewards, and competitive elements. Despite the high effectiveness of this approach in the educational process, its implementation requires significant resources and methodological study, especially in the context of teacher training, which in the future will have to work with younger students.

The use of cloud technology in an educational environment provides teachers and students with convenient access to educational materials, facilitates collaboration and automates assessment processes. However, the availability of cloud solutions depends directly on the level of digital infrastructure in educational institutions, which, in some cases, can become a serious obstacle to their implementation.

A SWOT analysis was conducted to comprehensively assess the strengths and weaknesses of current approaches to digitalization of teacher training, as well as identify potential opportunities and threats. The choice of this method is determined by its ability to systematize data and identify areas for improving educational strategies. The analysis was based on a review of existing educational programs, expert interviews with teachers from pedagogical universities, and survey results from students in pedagogical specialties.

Table 1 - SWOT analysis of the process of digital culture formation among future primary school teachers.

Strengths:	**Weaknesses:**
- The introduction of ICT in the educational process of pedagogical universities, which contributes to improving the digital literacy of future teachers. - Students have a positive attitude towards the use of digital technologies in the learning process, and a high level of motivation to learn new tools. - The availability of educational platforms and online courses aimed at developing digital competencies for future teachers.	- There is a lack of practice-oriented courses aimed at educating future teachers on the use of ICT in elementary school teaching. - Limited digital infrastructure in many pedagogical universities, insufficient funding for equipment modernization. - The uncertainty of criteria and standards of digital literacy of teachers, the lack of uniform methodological recommendations for the integration of ICT into the educational process of primary schools.
Opportunities:	**Threats:**
- Development of digital educational resources focused on practical use in primary schools (for example, interactive educational materials, platforms for distance learning of primary school students). - Professional development of teachers of pedagogical universities in the field of digital technologies, the introduction of specialized professional development programs. - Expansion of international cooperation and exchange of best practices in the field of teacher education digitalization.	- Low availability of modern educational technologies in certain regions, which leads to digital inequality among future teachers. - Financial constraints that hinder the systematic updating of educational programs and the digital infrastructure of universities. - Possible resistance from some teachers who prefer traditional teaching methods, which makes it difficult to introduce digital educational technologies.
Note: Compiled by the authors	

To verify the findings in practice, expert interviews with teachers from pedagogical universities and student questionnaires were used. Experts have confirmed that the most problematic aspects of the digitalization of teacher education remain insufficient methodological training in the use of ICT and a lack of technical resources. The survey of students revealed that

most consider digital technologies useful learning tools, but have difficulty applying them in teaching practice, which confirms the need for a more detailed study of curricula.

Thus, the results of the SWOT analysis indicate that there is a need for an integrated approach to the development of the digital culture of future primary school teachers. This requires the modernization of educational programs, the development of university digital infrastructure, and the strengthening of teachers' methodological training in ICT.

Important factors that require extra attention have been highlighted by a SWOT analysis conducted as part of a study on how future primary school teachers are forming their digital cultures. Although there are many chances for growth and development, there are also some obstacles and dangers that must be avoided. Future educators must successfully establish a digital culture through strategic planning that maximizes possibilities, minimizes risks, and strengthens strengths while reducing weaknesses. This procedure has serious difficulties that require a comprehensive strategy. The upgrading of technical infrastructure, the updating of instructional materials, and the professional development of educators all deserve special attention.

It is suggested that as part of the strategic directions, pedagogical universities should include specialized ICT courses in their curricula, update their technological infrastructure, and develop methodological materials to teach instructors and students the fundamentals of digital literacy. Long-term, systematic problem-solving of recognized issues and obstacles raises the bar for both digital literacy and overall educational quality, preparing skilled professionals for employment in the digital economy.

Recommendations for modernizing curricula and courses to meet the demands of the digital age were formulated during the investigation. These suggestions are grounded in an examination of educators' and students' current levels of digital literacy and consider the most recent developments in educational technology (Figure 1).

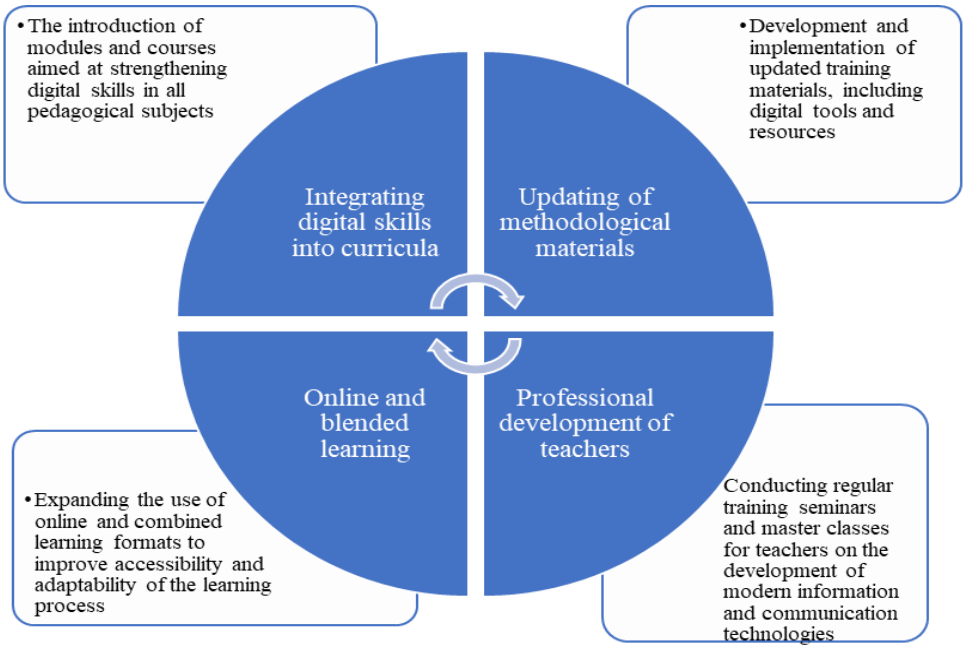

Figure 1 – Recommendations for the modernization of curricula and courses

Note: Compiled by the authors

To assess the effectiveness of ICT strategies and integrate feedback mechanisms into their development process, it is important to establish clear metrics and approaches. First, it is necessary to regularly measure students' and teachers' engagement through surveys and questionnaires, in which they assess the convenience and usefulness of the implemented technologies. It is also necessary to analyze students' academic performance before and after the introduction of ICT to identify changes in academic outcomes. Secondly, it is important to monitor technology usage frequency, which can be done through learning management systems such as Moodle or Google

Classroom. Technical indicators such as equipment stability and Internet availability should also be recorded and analyzed. Feedback mechanisms can be implemented through regular surveys, the creation of online forms to collect opinions in real time, and the organization of focus groups with students, teachers, and school administrators. The data obtained should be included in analytical reports that will allow timely identification of deficiencies and adaptation of strategies. Additionally, implementing pilot projects in a limited number of schools will help test new solutions and refine them before large-scale implementation.

To increase efficiency, it is recommended to set key indicators (KPIs), such as the percentage of students who regularly use educational platforms and the frequency of successful assignment completion. An important element is user training, including seminars for teachers and the establishment of a technical support center. This approach will ensure a systematic process for monitoring and adjusting ICT strategies, increasing their adaptability and success.

The proposals highlight the necessity of upgrading the educational process in a systematic manner. To achieve digital transformation, methodological and pedagogical approaches must be revised, along with the introduction of new technology. Digital competencies will be incorporated into courses to help students get ready for the demands of the contemporary workplace. Effective integration of digital technology in educational institutions will need training educators in ICT usage. The demands of the modern era on education and primary school teacher preparation will need to be addressed through strategic planning, funding, and collaboration among educational institutions, government agencies, and technology companies.

By putting these suggestions into practice, educators will be better prepared to employ ICT to raise student achievement. Additionally, it will help students prepare for successful careers in the digital economy and adjust to the rapidly changing technology landscape.

The study examined significant facets of how ICT is integrated into the development of future primary school teachers' digital cultures. Significant issues have been identified through an evaluation of the issues, a review of current approaches, and the development of recommendations to update courses and curricula. The survey's findings show that teachers and students have varying degrees of digital literacy, supporting the idea that customized teaching strategies are necessary to provide each with the training they need. The study's identification of infrastructure issues highlights impediments to the full integration of ICT. Still, it also presents opportunities for funding and advancement that can significantly improve the quality and accessibility of digital education.

The goal of curriculum update recommendations is to establish an adaptable and creative learning environment. The incorporation of useful digital skills in curricula and the professional development of educators are the two key components of this process. The report emphasizes how digital literacy and culture are becoming essential components of contemporary education. Thus, educational institutions, policymakers, and society at large are increasingly prioritizing the strategic training of teachers and students to use ICT effectively. The foundation for encouraging digital culture among aspiring primary school teachers is a thorough examination of the current situation, the issues to be addressed, the opportunities available, and the recommendations formulated. The successful transition to an integrated and effective digital educational paradigm will depend heavily on adaptation, creativity, cooperation, and strategic and systemic approaches from all stakeholders.

In the conditions of schools in the Aktobe region, where access to modern technologies and financial resources may be limited, the integration of information and communication technologies (ICT) into the educational process requires adapting approaches. First of all, it is necessary to focus on using available technologies, such as mobile devices and simple projectors, which are often present even in schools with minimal technical equipment. Educational materials can be prepared as offline content, uploaded to USB storage media or disks, allowing them to be used even in the absence of stable Internet access.

For the successful integration of information and communication technologies (ICT) into the educational process of schools in the Aktobe region, it is necessary to take more concrete, practical steps that address regional conditions and current challenges.

The first step will be to create a pilot project in several schools selected based on the results of the preliminary audit. For example, you can choose one urban school with a strong technical foundation and one rural school with limited access to technology. As part of the pilot project, a local server with preloaded educational content (educational materials, video tutorials, tests) can be installed in a rural school, available over a local network without an Internet connection. This approach has already been successfully implemented in remote regions of Kazakhstan and has demonstrated high efficiency under limited-resource conditions.

The second step is to develop curricula adapted to the region's conditions. For example, schools in the Aktobe region can use local context when creating educational content: geography lessons can include multimedia materials on the region's natural and economic features, and history lessons can include interactive presentations on events related to the region. This will not only increase students' interest but also strengthen their connection to their native region. For schools with limited infrastructure, such materials can be distributed on flash drives or SD cards.

The third step is organizing local training sessions for teachers. For example, intensive courses for teachers can be organized in district centers that cover both basic computer skills and more complex techniques such as using interactive whiteboards or creating their own educational materials. After completing the courses, teachers can share their experiences with colleagues in schools, thereby accelerating the adoption of technology. To support teachers in remote areas, field trainings can be organized or pre-prepared video courses can be used.

The fourth step is to introduce hybrid learning models that combine traditional methods with digital tools. For example, students can be assigned projects, such as creating multimedia presentations on local attractions or recording videos on the region's cultural traditions. These tasks do not require complex equipment, but they allow you to actively use technology. For rural schools where the Internet may not be available, educational platforms with interactive exercises, such as Khan Academy or Moodle, can be downloaded in advance for offline use.

The fifth step is to create a system of motivation and encouragement for students and teachers. For example, contests such as "The best digital Project" among students or "The best lesson using ICT" among teachers can be organized within schools in the Aktobe region. Winners can receive not only diplomas, but also specific awards, such as equipment for schools or access to additional educational resources. This encourages teachers to actively apply technology, and students to develop digital skills.

These steps are aimed at creating a sustainable ICT integration system in schools in the Aktobe region, taking into account their current limitations and peculiarities. They include both technical and educational solutions to enhance the quality of learning and to ensure equal access to technology for all students.

Several key steps need to be taken to improve school infrastructure in limited-resource settings. Firstly, to ensure a stable Internet connection in remote areas, satellite Internet technologies such as Starlink can be used, or local Internet service providers can be involved in creating regional networks. This will minimize costs and increase Internet availability. Secondly, to supply schools with the necessary equipment, it is recommended to use refurbished equipment, attract sponsors from local companies, and implement programs to redistribute equipment between schools. In conditions of limited Internet access, an effective solution would be to install local servers with educational materials available offline, which has already proven effective in many regions. Third, government programs to support the digitalization of rural schools should include subsidies for Internet connectivity and grants for equipment purchases. International grant programs, such as UNESCO initiatives, can also be a source of funding. In addition, it is important to train teachers and school staff to make effective use of available resources by providing instruction on working with open-source software and on teaching methods to optimize existing infrastructure. These measures will create conditions for equal access to technology and improve the quality of education in schools with minimal resources.

This study analyzes the effectiveness of various methods for integrating information and communication technologies (ICT) into the training of future primary school teachers. The research used quantitative and qualitative methods, including expert interviews with teachers at

pedagogical universities, a survey of students in pedagogical specialties, and a comparative analysis of educational programs with digital components. The data obtained made it possible to identify the strengths and weaknesses of existing strategies for the digitalization of teacher education, as well as the most effective methods for fostering a digital culture among future teachers.

To assess the effectiveness of the claimed methods, a comparative analysis of two groups of students from pedagogical universities was conducted. The first group included students enrolled in programs that actively use ICT, such as blended learning, project technologies, and gamification. The second group includes students studying according to traditional methods, without an explicit focus on digital technologies. The test results showed that the students of the first group were 35% more likely to use digital tools when preparing teaching materials, 42% more actively used online platforms in educational activities, and 27% more likely to assess their readiness to use ICT in future teaching practice compared to the students of the second group.

Expert interviews with teachers have shown that the most effective methods are blended learning and a project-based approach using digital tools. 82% of the experts surveyed noted that the integration of ICT helps increase student engagement, develop students' digital competencies, and deepen their study of educational material. However, 64% of teachers also pointed out the difficulty of adapting traditional educational programs to digital formats due to the lack of methodological materials and clear standards for digital literacy for future teachers.

The survey of students revealed several problems that hinder the effective development of digital technologies. 49% of respondents noted a lack of practical classes where they could apply their knowledge of digital tools in real teaching practice. 38% of students expressed concern about the lack of technical support at universities, making it difficult to access modern digital educational resources.

An analysis of the educational programs of pedagogical universities has shown that currently only 57% of courses include specialized disciplines related to digital technologies. In most cases they are theoretical in nature and do not provide for students' active involvement in working with real educational digital tools. In universities where the programs were adapted to account for digitalization, students demonstrated higher levels of digital competence and confidence in the use of technology in teaching.

Data analysis confirms the effectiveness of integrating ICT into the training of future teachers, but also reveals several problems that need to be addressed. The most important aspects of further modernization of the teacher training system are: expansion of practice-oriented courses on digital technologies, improvement of university technical equipment, creation of uniform standards for teachers' digital literacy, and active introduction of mixed and project-based teaching methods.

Conclusion

Information and communication technologies are becoming increasingly essential in education in the current world, where technological advancements are occurring at a pace never before seen. Our research has thoroughly examined this subject, evaluating the current state of digital literacy among educators and learners, as well as the issues and challenges related to ICT integration. Based on this analysis, we have developed a set of strategic recommendations for curriculum updates.

We have concluded that, to meet the demands of the digital age, educational approaches urgently need to be updated through data analysis, SWOT analysis, and review. The effectiveness of these initiatives is reduced by barriers, including inadequate teacher training, infrastructure limitations, and a lack of funding, despite significant enthusiasm and motivation for the use of ICTs.

The suggested strategic ideas seek to provide an inclusive, flexible, and adaptable learning environment while also balancing pedagogical and technical advancements. The growth of teachers' professionalism, the modification of curricula, and the establishment of the required infrastructure are crucial components of this process.

Ultimately, our examination verifies that the shift to a digitally focused school signifies not just a technological shift but also a cultural, pedagogical, and societal transformation. This calls for teamwork, creative thinking, and a long-term plan in which digital literacy will be an essential component of both professional and basic education.

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БОЛАШАҚ БАСТАУЫШ СЫНЫП МҰҒАЛІМДЕРІНІҢ ЦИФРЛЫҚ МӘДЕНИЕТІН ҚАЛЫПТАСТЫРУҒА АКТ ИНТЕГРАЦИЯЛАУ СТРАТЕГИЯЛАРЫ

Аңдатпа

Мақалада болашақ бастауыш сынып мұғалімдерін даярлауға ақпараттық-коммуникациялық технологияларды (АКТ) интеграциялау стратегиялары егжей-тегжейлі қарастырылады. Жаһандану және технологиялардың қарқынды дамуы жағдайында мұғалімдердің цифрлық мәдениетін қалыптастырудың қолданыстағы тәсілдерін талдауға ерекше назар аударылды. Авторлық талдау қолданыстағы әдістерді бағалауды, олардың кемшіліктерін анықтауды және оқу бағдарламалары мен курстарды оңтайландыру бойынша ұсыныстарды қамтиды. Акт интеграциясы пәнаралық көзқарасты қажет ететін күрделі мәдени, педагогикалық және әлеуметтік процесс ретінде ұсынылған. Зерттеудің мақсаты ақпараттық-коммуникациялық технологияларды (АКТ) жаһандану жағдайында олардың цифрлық мәдениетін қалыптастыруға және қолданыстағы тәсілдерді талдау, олардың шектеулерін анықтау және білім беру бағдарламалары мен әдістемелерін жетілдіру бойынша практикалық-бағдарланған ұсыныстарды әзірлеу негізінде білім беруді цифрлық трансформациялауға бағытталған болашақ бастауыш сынып мұғалімдерін даярлау процесіне интеграциялаудың тиімді стратегияларын теориялық негіздеу және әзірлеу болып табылады. Зерттеу нәтижелері білім беру инфрақұрылымын жаңғырту, Цифрлық модульдерді әзірлеу және мұғалімдердің кәсіби даярлығын жетілдіру қажеттілігін растайды. Мақалада болашақ мұғалімдердің цифрлық мәдениетін қалыптастыру технологияларды педагогикалық инновациялармен, жеке тәсілдермен және әдістемелік базаны үнемі жаңартумен ұштастыра отырып қана мүмкін болатындығы баса айтылған. Зерттеу нәтижелері жобалық оқытуды, гибридті форматтарды, геймификацияны және бұлттық технологияларды енгізу сияқты білім беру процесін жақсарту бойынша стратегиялық ұсыныстарды қамтиды. Алынған мәліметтер айтарлықтай практикалық құндылыққа ие және білім беру мекемелері, саясаткерлер мен зерттеушілер арасындағы диалогты қалыптастыруға ықпал етеді. Авторлар қоғамның цифрлық трансформациясы жағдайында мұғалімдердің кәсіби дайындығының негізі болатын тұрақты цифрлық мәдениетті құру үшін жүйелі тәсіл қажет деген қорытындыға келеді.

Негізгі сөздер: ақпараттық-коммуникациялық технологиялар, цифрлық мәдениет, білім беру процесі, бағдарламаларды жаңғырту, цифрлық сауаттылық.

СТРАТЕГИИ ИНТЕГРАЦИИ ИКТ В ФОРМИРОВАНИЕ ЦИФРОВОЙ КУЛЬТУРЫ БУДУЩИХ УЧИТЕЛЕЙ НАЧАЛЬНЫХ КЛАССОВ

Аннотация

В статье подробно рассматриваются стратегии интеграции информационно-коммуникационных технологий (ИКТ) в подготовку будущих учителей начальных классов. Особое внимание уделено анализу существующих подходов к формированию цифровой культуры учителей в условиях глобализации и стремительного развития технологий. Авторский анализ включает оценку существующих методов, выявление их недостатков и предложения по оптимизации учебных программ и курсов. Интеграция ИКТ представлена как сложный культурный, педагогический и социальный процесс, требующий междисциплинарного подхода. Цель исследования заключается в теоретическом обосновании и разработке эффективных стратегий интеграции информационно-коммуникационных технологий (ИКТ) в процесс подготовки будущих учителей начальных классов, направленных на формирование их цифровой культуры в условиях глобализации и цифровой трансформации образования на основе анализа существующих подходов, выявления их ограничений и разработки практико-ориентированных рекомендаций по совершенствованию образовательных программ и методик обучения. Результаты исследования подтверждают необходимость модернизации образовательной инфраструктуры, разработки цифровых модулей и совершенствования профессиональной подготовки учителей. В статье подчеркивается, что формирование цифровой культуры будущих учителей возможно только при сочетании технологий с педагогическими инновациями, индивидуальными подходами и постоянным обновлением методической базы. Результаты исследования включают стратегические рекомендации по совершенствованию образовательного процесса, такие как внедрение проектного обучения, гибридных форматов, геймификации и облачных технологий. Полученные данные имеют значительную практическую ценность и способствуют формированию диалога между образовательными учреждениями, политиками и исследователями. Авторы приходят к выводу, что необходим системный подход для создания устойчивой цифровой культуры, которая станет основой профессиональной подготовки педагогов в условиях цифровой трансформации общества

Ключевые слова: информационно-коммуникационные технологии, цифровая культура, образовательный процесс, модернизация программ, цифровая грамотность.

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