BLENDED LEARNING AS A TOOL FOR DEVELOPING STUDENTS' DIGITAL COMPETENCE

Nasibakhon Yusufjonovna Rasulova
Senior Lecturer, Department of Information and Educational Technologies Tashkent
University of Information Technologies named after Muhammad al-Khwarizmi. Uzbekistan

Otakhon Masharipovich Normatov
Senior Lecturer, Department of Information and Educational Technologies Tashkent
University of Information Technologies named after Muhammad al-Khwarizmi. Uzbekistan

Abstract

The article discusses the use of the blended learning model for developing the digital competence of students in engineering and pedagogical fields. An overview of the concept of digital competence and its importance in the context of digitalization of education is presented. A methodology based on the use of the DigitalSkills platform is described, which contributes to the development of key digital skills of students when completing independent tasks of varying levels of complexity. The results of the study are presented, demonstrating high student satisfaction with the platform functionality and its potential in the educational process. A conclusion is made about the importance of implementing adaptive digital technologies to improve the quality of training specialists in the context of the digital transformation of society.

Keywords: Blended learning, digital competence, independent work, engineering and pedagogical areas, Digital Skills, digital technologies, adaptive learning, digitalization of education, professional training.

СМЕШАННОЕ ОБУЧЕНИЕ КАК ИНСТРУМЕНТ РАЗВИТИЯ ЦИФРОВОЙ КОМПЕТЕНЦИИ СТУДЕНТОВ

Насибахон Юсуфжоновна Расулова
Старший преподаватель кафедры «Информационно-образовательные технологии»
Ташкентский университет информационных технологий имени Мухаммада ал-Хорезми.
Узбекистан

Отахон Машарипович Норматов
Старший преподаватель кафедры «Информационно-образовательные технологии»
Ташкентский университет информационных технологий имени Мухаммада ал-Хорезми.
Узбекистан

Аннотация:

в статье рассматривается применение модели смешанного обучения (blended learning) для развития цифровой компетенции студентов инженерно-педагогических направлений. Представлен обзор концепции цифровой компетенции и её значимости в условиях

цифровизации образования. Описана методика, основанная на использовании платформы DigitalSkills, которая способствует развитию ключевых цифровых навыков студентов при выполнении самостоятельных заданий различного уровня сложности. Приведены результаты исследования, демонстрирующие высокую удовлетворённость студентов функционалом платформы и её потенциал в образовательном процессе. Сделан вывод о важности внедрения адаптивных цифровых технологий для повышения качества подготовки специалистов в условиях цифровой трансформации общества.

Ключевые слова: Смешанное обучение, цифровая компетенция, самостоятельная работа, инженерно-педагогические направления, DigitalSkills, цифровые технологии, адаптивное обучение, цифровизация образования, профессиональная подготовка.

Introduction

Blended learning (blended learning) is one of the most promising educational models, combining traditional methods of face-to-face interaction between the teacher and the student using digital technologies. This approach ensures the flexibility of the learning process, adapting educational trajectories to the individual needs of students, and increasing their engagement in learning. In the era of digitalization, blended learning is becoming particularly relevant, as it is aimed at integrating modern technologies into the educational process and creating new opportunities for acquiring knowledge and skills.

One of the key aspects of successfully implementing blended learning is the development of digital competence among participants in the educational process. Digital competence encompasses a wide range of skills, including the ability to work with information systems, analyze data, effectively use digital tools to solve professional and educational tasks, and adhere to digital security rules. Developing digital competence not only contributes to improving the quality of education, but also plays an important role in preparing students for the challenges of the modern economy, where digital skills are becoming an integral part of professional competence.

The use of digital platforms in blended learning, such as DigitalSkills, provides broad opportunities for the development of students' digital competence. These platforms help to organize independent work, provide access to high-quality educational resources, promote the mastery of new technologies, and allow for the application of interactive tasks, increasing students' engagement and motivation. Therefore, combining a blended learning approach with a purposeful development of digital competence becomes a powerful tool for preparing students for professional activity in the context of societal digital transformation.

The relevance of the research is determined by the need to prepare qualified future engineer-teachers in the context of digitalization of education, with a particular emphasis on using blended learning models. Digital competence, as a key element of professional training, plays an important role in students' successful adaptation to the challenges of the modern digital world and their further professional activities. In the context of rapid technological development and the integration of information and communication technologies (ICT) into the educational process, understanding and developing digital competence is becoming critically important.

The research aims to identify optimal strategies for using blended learning to develop students' digital competence. The use of elements of independent work in a digital environment, characteristic of blended learning, provides unique opportunities for developing skills in working with modern technologies, increasing self-regulation, and developing practical skills necessary for the labor market.

The purpose of the study is to present a modern methodology for developing students' digital competence in the process of completing independent work within the framework of blended learning.

Research Objectives:
• To study the concept of digital competence in the context of professional education and its significance for future engineer-teachers.
Review existing approaches and methods aimed at developing digital skills.
• Present an approved methodology aimed at effectively developing the digital competence of engineering and pedagogical students.
The presented research is aimed at solving the urgent task of integrating digital technologies into the educational process and improving the level of student training in the context of the digital transformation of education.

A brief analysis of scientific research. The term "digital competencies" is becoming increasingly relevant and defines the development of education. This is confirmed by the increase in the number of publications on this topic in the Scopus and Google Scholar databases. For example, the search query for the key combination of the words "digital competence" in Scopus shows an increase in the number of publications from 140 in 2015 to 1224 in 2023. A similar trend is observed in the Google Scholar database, where the number of publications on this topic increased from 378 in 2015 to 8900 in 2023. This quantitative analysis demonstrates an exponential increase in publications on digital competencies.

In this regard, it is extremely important to understand the terminology and concepts related to digital transformation in order to fully understand the digital skills and advantages of digitalization in education. This is necessary for the development of approaches to the formation of digital competencies, the creation of models and methodologies for their formation, as well as the development of strategies for updating digital competencies. Only a comprehensive understanding of this issue will allow for the effective development and updating of students' digital skills in the field of vocational education.

There are many definitions of digital competence. A group of scientists from the University of Spain considers digital competence to be the ability to use digital resources and information technologies, to understand and critically evaluate digital resources and content, and to communicate effectively. Scientists have identified the following components of digital competence: information and media literacy; online communication; technical and consumer components.

Based on a detailed analysis, Rahmawati S. interprets digital competence as "a set of knowledge, skills necessary to use information technologies and digital media to solve tasks; solve problems;

manage information; collaborate; communicate; create and disseminate content; joint activities and meet needs" [2].

G.A. Afanaseva, A.A. Zyabkov, and other researchers consider digital competencies to be "high-level meta-abilities for the existence of high-mobility intelligent devices in the digital space" [3], necessary for successful adaptation in the digital space where high-tech intelligent devices are used. According to them, digital technologies play a key role in transforming an individual into a confident user capable of independently processing information and effectively communicating for joint information exchange.

In a study by the European Commission titled "Digital Competence in Practice: Frame Analysis,"[1] digital competence is defined as one of the key skills necessary for lifelong learning and development. Digital competence encompasses the ability to confidently, critically, and responsibly interact with digital technologies in the context of education, professional activity, the workplace, and active participation in public life.

Regarding the digital competence of students in Uzbek universities, an analysis revealed a large number of works, among which: Zakirova F.M., Khamraeva G.R.[5], Makhmudov A.Kh.[6], Delov T.E.[7], Salimov S.S.[7]

Thus, Salimov S.S. in his research interprets digital competence as the ability to effectively and effectively use ICT in his pedagogical activities and for his professional development. The components of digital competence include additional knowledge, skills, abilities, and attitudes, among which are the technical skills of working with ICT, the ability to apply these resources in the educational process, and the ability to plan, analyze, and manage the educational process through information and communication technologies. The teacher must also critically assess resources and be well acquainted with the social and ethical aspects of their use.

According to T.E. Delov, digital competence is the ability to apply modern digital technologies in one's professional activities. The author believes that the future teacher should be able to critically assess resources and use them taking into account pedagogy, be familiar with the goal - using various educational resources. The selection of materials is carried out taking into account the specifics of the academic discipline, the peculiarities of the students, the specific topic of the lesson.

The digital competence of students in the field of information technology (IT) is their ability to effectively use digital technologies, tools, and resources to solve problems related to information, programming, software development, digital content, data analysis, and other aspects of IT. It also includes the ability to adapt to new technologies, think critically, solve problems, and communicate effectively in the digital environment. Considering this definition in the context of professional education, we formulated the following definition for future engineer-teachers.

Digital competence is the ability to apply digital technologies and tools in the process of teaching IT educational disciplines and skills using digital resources. This encompasses the ability to effectively use educational platforms, interactive learning materials, as well as various applications and software for creating interactive lessons, laboratory work, and projects. Accordingly, the digital competence for future engineer-teachers includes the ability to adapt learning materials and methods to the specifics of IT-educational disciplines, contributing to the effective assimilation of knowledge and the development of professional skills.

Methodology. The DigitalSkills platform was developed for independent work on the subject "Digital Technologies in Education" in accordance with the curriculum of this subject.

Independent work is a pedagogical method that includes the student's activity aimed at mastering and consolidating knowledge, skills, and abilities without the direct involvement of the teacher in the learning process. This method involves students actively using various educational resources, independently studying the educational material, completing educational tasks, as well as searching and analyzing information to achieve educational goals.

Independent work contributes to the development of students' self-organization, self-regulation, and independence in the learning process. It allows them to deepen their knowledge, develop critical thinking and self-control, and also actively apply the acquired knowledge in solving specific tasks. Independent work is also closely related to control, as control is considered the final stage of independent work and is evaluated. Nowadays, most independent works are accepted in the form of reports, references or presentations. We consider it appropriate if the discipline requires a student to conduct a methodological or literary analysis, comparative analysis, work with literature and scientific articles. But if it is an engineering-pedagogical subject, we believe that such a format of work completion and completion is not productive. The proposed methodology is based on developing the skills necessary for future engineer-teachers and obtaining visual results in the form of a developed portfolio, interactive presentation, or educational game.

The concept of the methodology for applying this platform lies in the fact that after registration, the student has the opportunity to choose the difficulty level of the task. At the same time, it is possible to change the levels if the student did not complete the task due to insufficient knowledge and skills.

It is proposed to use a differentiated approach to the organization of assignments, which includes three levels of complexity: basic, medium, and advanced. The basic level includes 9 assignments aimed at mastering basic concepts and terminology, the average - 6 assignments that involve applying digital knowledge in typical situations, and the advanced level - 4 assignments aimed at solving complex tasks that require integration and analysis of acquired knowledge.

Given the advantages and limitations of each level, it is advisable to use a combined assignment format. Thus, test assignments allow for the assessment of mastery of basic terminology and the basics of digital literacy, while the completion of case studies or practical assignments demonstrates the depth of knowledge and skills.

The criteria for determining the levels of digital competence of future engineer-teachers have been developed based on the approaches proposed in the International Telecommunication Union Guide to Assessing Digital Skills. These criteria ensure objectivity and systematicity in assessing digital competencies, contributing to their development in accordance with the modern requirements of the educational environment and the labor market.
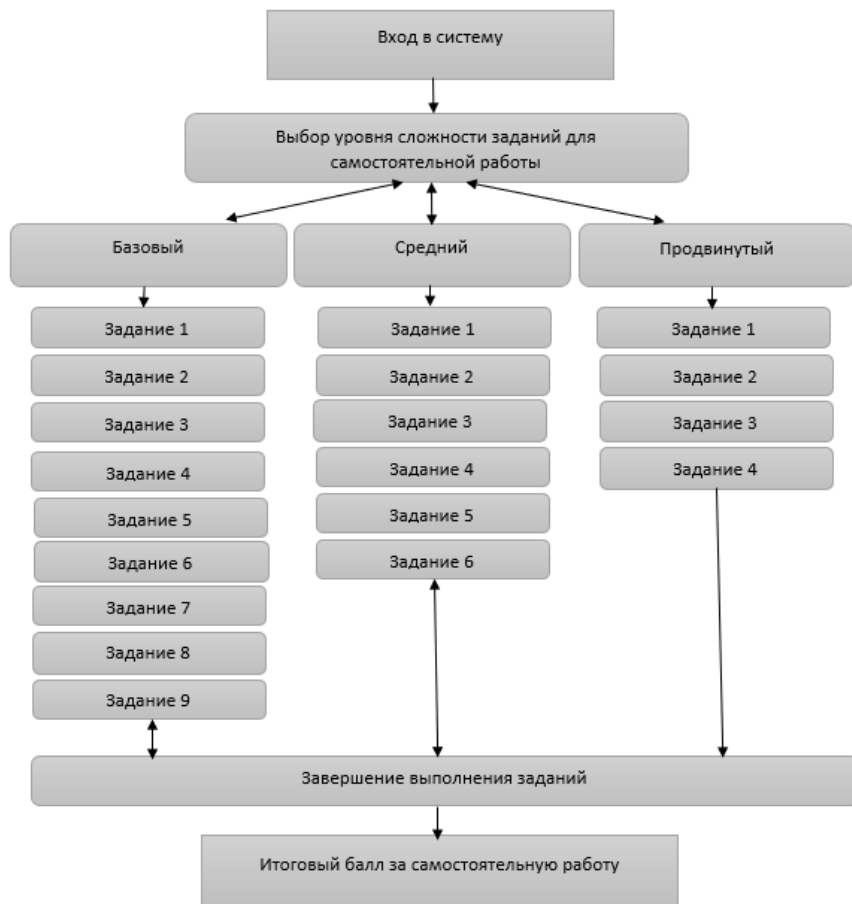
Figure 1. Schematic representation of tasks with 3 difficulty levels. (developed by author)

After completing the independent work, the students were asked a questionnaire consisting of 10 questions, with the help of which we learned the opinions of the students about the DigitalSkills platform. The survey was assessed using the Likert scale. The questions were formulated in the form of affirmations, and the students were asked to answer in a more suitable version.
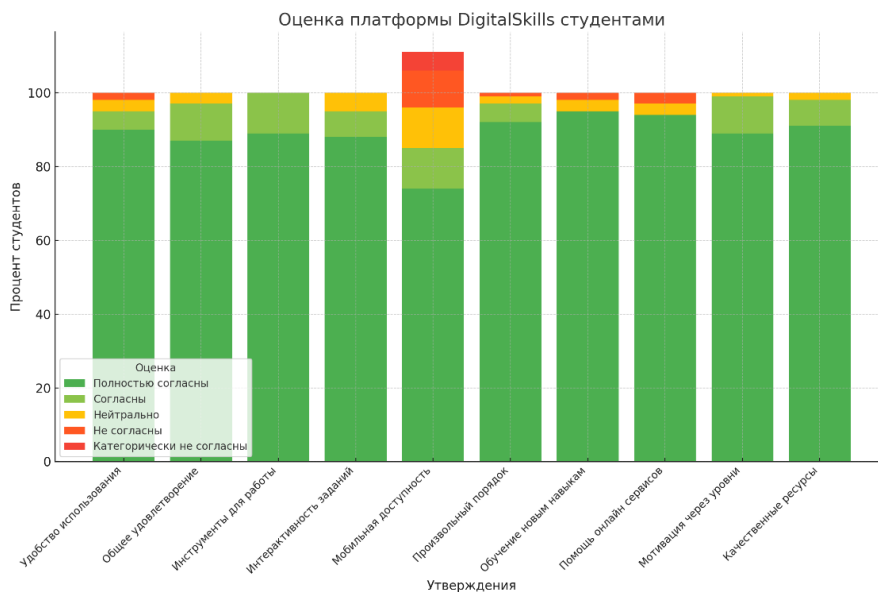

Figure 2. Assessment of key characteristics of the DigitalSkills platform by students

The results of the study on the assessment of the DigitalSkills platform by students demonstrate a high level of satisfaction in a number of key aspects. Most students have a positive assessment of the platform's user-friendliness, functionality, and accessibility of educational resources. The highest indicators received confirmations related to the ability to complete assignments in an arbitrary manner (92% agree), master new skills (95% agree), and use online services to improve the quality of learning (94% agree). This indicates that the platform successfully supports the educational process and contributes to the development of key digital competencies.

Particular attention is paid to the mobile accessibility aspect of the platform, where a relatively high level of neutral and negative assessments is observed: 11% are neutral, 10% disagree, and 5% are categorically disagreeable. This may indicate the need for further improvement of the mobile interface and its user-friendliness.

The data also highlights the importance of the platform's interactivity and motivational mechanisms. Most students noted that the assignments are interesting (88% agree) and contribute to motivation through the selection of difficulty levels (89% agree). These characteristics confirm the importance of an adaptive approach to digital learning, focused on the individual needs of students.

The research findings allow us to conclude that the DigitalSkills platform demonstrates significant potential for developing students' digital competencies, however, it requires refinement in terms of providing mobile accessibility and taking into account users' individual critical comments. The research findings can be used to further improve the functionality of the platform and adapt it to the educational needs of students in the context of digital transformation.

Conclusion. Developing the digital competence of future engineer-teachers who will teach special disciplines is of particular relevance in modern education. In the era of rapid technological development and digitalization of society, digital skills are becoming an integral part of the professional competence of specialists. The professional activity of this direction includes not only the transfer of technical knowledge and skills, but also the use of modern digital technologies in the educational process. Mastering digital competence allows future engineer-teachers to effectively utilize innovative educational methods, interactive resources, and online platforms to enhance the quality of training and preparation for modern challenges and labor market demands. It is important to consider that future engineer-teachers should not only possess technical knowledge, but also be able to adapt it to effective learning, which emphasizes the need to develop their digital competence.

In conclusion, the presented methodology for developing the digital competence of future engineering teachers in independent work is an important step in improving the training of specialists in the field of vocational education. The proposed methodology allows students not only to master the basic principles of digital technologies, but also to develop skills in independent work, critical thinking and a creative approach to solving problems, as well as to develop confidence and self-esteem. This is especially important in the context of the rapid development of information technologies and the improvement of professional competence requirements for specialists.

REFERENCES:

1. Sánchez-Caballé A., Gisbert Cervera M., Esteve-Mon F. M. The digital competence of university students: a systematic literature review. – 2020.

2. Rahmawati S. THE IDENTIFICATION OF VOCATIONAL HIGH SCHOOL TEACHERS'ADVANCED DIGITAL COMPETENCE: OVERVIEW AND ANALYSIS : дис. – Universitas Pendidikan Indonesia, 2023.

3. Афанасьева Г.А., Зябков А.А. Развитие образовательного процесса в новой цифровой среде // Экологическое образование и воспитание. – 2018. – № 2. – С. 101–106.

4. https://www.etf.europa.eu/sites/default/files/2019-08/dsc_and_dol_ru_0.pdf

5. Закирова Ф. М., Рустамовна Ҳ. Г. КАСБ ТАЪЛИМ ЙЎНАЛИШИ ТАЛАБАЛАРИНИ РАҚАМЛИ КОМПЕТЕНТЛИГИНИ МУЛЬТИМЕДИАЛИ ЛОЙИҲА АСОСИДА РИВОЖЛАНТИРИШ //Современное образование (Узбекистан). – 2021. – №. 3 (100). – С. 32-38.

6. А. Х. Махмудов ЗАМОНАВИЙ ТАЪЛИМНИ РИВОЖЛАНТИРИШДА РАҚАМЛИ ТЕХНОЛОГИЯЛАРНИНГ ЎРНИ // Academic research in educational sciences. 2021. №NUU Conference URL: https://cyberleninka.ru/article/n/zamonaviy-talimni-rivozhlantirishda-ra-amli-tehnologiyalarning-rni (дата обращения: 25.07.2022).

7. Erkinovich D. T. 3D TEXNOLOGIYALARI ASOSIDA YARATILGAN MILLIY VIRTUAL TA'LIM MUHITI VA UNI TA'LIMGA JORIY QILISH //International Journal of Contemporary Scientific and Technical Research. – 2022. – С. 299-302.

8. Салимов С. С. ОРГАНИЗАЦИЯ ПРОЦЕССА ФОРМИРОВАНИЯ ЦИФРОВОЙ КОМПЕТЕНТНОСТИ В СИСТЕМЕ ДИСТАНЦИОННОГО ОБРАЗОВАНИЯ //НАУЧНЫЙ ЖУРНАЛ «CETERIS PARIBUS». – 2024. – С. 57.

9. Расулова, Н. Ю. (2023). ФОРМИРОВАНИЕ ЦИФРОВЫХ КОМПЕТЕНЦИЙ У БУДУЩИХ ИНЖЕНЕР-ПЕДАГОГОВ НА ПРИМЕРЕ ПРАКТИЧЕСКОГО ЗАНЯТИЯ: Расулова Насибахон Юсуфжоновна Старший преподаватель Ташкентского университета информационных технологий имени Мухаммада ал-Хоразми. Образование и инновационные исследования международный научно-методический журнал, (1), 283-287.

10. Núñez-Canal M., de Obesso M. M., Pérez-Rivero C. A. New challenges in higher education: A study of the digital competence of educators in Covid times // Technological Forecasting and Social Change. 2022. Vol. 174. DOI: https://doi.org/10.1016/j.techfore.2021.121270.