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A Model for Improving and Implementing Software to Develop Students' Digital-Technological Competence

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Abstract

This article presents a model for improving and implementing software to develop students' digital and technological competence. The novelty lies in integrating pedagogical and digital technologies into a unified model. The study employs system analysis, modeling, and comparative analysis. The findings confirm improved effectiveness in developing students' professional competencies.

Keywords: Digital and technological competence, software, implementation model, digital technologies, educational process, students, professional competencies.

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1. Introduction

The modern digital transformation of the education system necessitates the development of students' digital and technological competence as one of the key components of their professional training [3]. In the context of the widespread implementation of information and communication technologies, the development and integration of software that ensures the effective enhancement of students' digital skills is becoming particularly important.

Despite the considerable number of studies conducted in this field, issues related to the comprehensive improvement of software in accordance with modern educational requirements remain insufficiently explored. Therefore, the aim of this study is to develop a model for improving and implementing software aimed at enhancing the effectiveness of developing students' digital and technological competence.

2. Literature Review

An analysis of the scientific literature indicates that the development of students' digital and technological competence has been widely addressed in both national and international research. Particular attention has been paid to the use of digital educational technologies, electronic educational resources, and specialized software to improve the quality of students' professional training [1].

At the same time, most existing studies focus on individual aspects of the digitalization of the educational process. Issues concerning the comprehensive improvement and implementation of software that ensures the systematic development of students' digital and technological competence remain insufficiently investigated. This highlights the need to develop a model

that integrates modern pedagogical approaches, digital technologies, and software tools into a unified educational system.

3. Methodology

The methodological framework of this study is based on systemic, competency-based, and activity-based approaches. The research employed methods of scientific literature analysis and synthesis, comparative analysis, systems analysis, pedagogical modeling, and expert evaluation [2].

The development of the model for improving and implementing software was carried out in accordance with the modern requirements of the digital transformation of education and the principles of developing students' digital and technological competence. The effectiveness of the proposed model was evaluated based on an analysis of its structural components, functional capabilities, and alignment with educational objectives.

4. Analysis and Research Findings

In the context of the digital transformation of higher education, one of the priority areas is the development of students' digital and technological competence through modern software tools. The analysis conducted revealed that existing digital educational platforms and software products offer extensive functional capabilities; however, in most cases, they are designed to address specific educational tasks and do not ensure the comprehensive development of students' digital and technological competence. This necessitates the development of a model that integrates pedagogical, technological, and organizational components into a unified system [4].

The proposed model for improving and implementing software is based on the principles of systematicity, modularity, adaptability, interactivity, and practical orientation. The structure of the model comprises the following interrelated components: target, content-based, technological, organizational, diagnostic, and outcome-based components.

The target component defines the main objectives of the software, which are aimed at developing students' sustainable digital competencies [5], enhancing their skills in working with modern information technologies, digital educational resources, cloud services, data analysis tools, and collaborative interaction platforms.

The content-based component предусматривает the integration of theoretical materials, practical assignments, interactive modules, electronic learning resources, multimedia content, and automated knowledge assessment tools. This approach ensures the systematic acquisition of digital technologies by students and contributes to the development of their professional competencies.

The technological component of the model involves the use of web platforms, mobile applications, cloud technologies, distance learning systems, artificial intelligence technologies, educational data analysis tools, and digital instruments for monitoring learning activities [6]. The integration of these technologies makes it possible to ensure flexibility in the educational process and increase student engagement.

The organizational component provides for a phased implementation of the software. At the first stage, the level of students' digital and technological competence is diagnosed, and their educational needs are analyzed. The second stage involves designing and adapting the software in accordance with the specific characteristics of the educational program. At the third stage, the software product is practically implemented in the educational process, accompanied by methodological support for teachers and students. The final stage involves monitoring the results, evaluating the effectiveness of the model, and making subsequent improvements.

Table 1[1]. Criteria and Indicators for Assessing Students' Digital and Technological Competence

Competence Criterion	Competence Criterion	Competence Criterion	Competence Criterion
Indicators	Indicators	Indicators	Indicators
Assessment Method	Assessment Method	Assessment Method	Assessment Method
Expected Outcome	Expected Outcome	Expected Outcome	Expected Outcome
Digital Literacy	Digital Literacy	Digital Literacy	Digital Literacy

Proficiency in using computers and mobile devices, operating systems, and office software	Proficiency in using computers and mobile devices, operating systems, and office software	Proficiency in using computers and mobile devices, operating systems, and office software	Proficiency in using computers and mobile devices, operating systems, and office software
Practical assignments, testing	Practical assignments, testing	Practical assignments, testing	Practical assignments, testing
Students develop the skills to use digital tools independently and effectively.	Students develop the skills to use digital tools independently and effectively.	Students develop the skills to use digital tools independently and effectively.	Students develop the skills to use digital tools independently and effectively.
Information Literacy	Information Literacy	Information Literacy	Information Literacy

The diagnostic component is based on a system of qualitative and quantitative indicators that make it possible to assess the level of development of students' digital and technological competence [7]. The main assessment criteria include proficiency in using digital tools, the ability to apply modern information technologies to solve professional tasks, digital communication skills, information security awareness, data analysis skills, and the ability to independently acquire knowledge of new digital services.

The analysis of the research findings demonstrated that the implementation of the developed model contributes to improving the effectiveness of the educational process by expanding opportunities for independent learning, personalizing educational pathways, and automating the assessment of academic achievements. The use of software ensures a higher level of students' digital engagement, increases their learning motivation, and contributes to the development of critical thinking, digital literacy, and professional mobility.

The practical significance of the proposed model lies in its applicability to educational institutions of various profiles, regardless of their fields of study. The model has a modular structure, which makes it possible to adapt it to the requirements of a specific educational program, students' levels of preparedness, and the characteristics of the digital learning environment.

The findings indicate that the comprehensive improvement and implementation of software create favorable conditions for developing students' digital and technological competence, improving the quality of professional training, and meeting the modern requirements of digital transformation in higher education [8]. The proposed model can serve as a methodological and practical foundation for the further development of the digital educational environment in higher education institutions and the improvement of professional training technologies.

5. Conclusion

The conducted study confirmed the relevance of developing and implementing a model for improving software to enhance students' digital and technological competence. The proposed model ensures the comprehensive integration of modern digital technologies, pedagogical approaches, and software tools, thereby contributing to greater educational effectiveness and improved quality of students' professional training.

The findings demonstrate that the application of the developed model contributes to the development of students' digital competencies, increases their motivation to learn, and enhances their readiness for professional activities in the digital economy. The practical significance of the study lies in the possibility of applying the model in higher education institutions across various fields of study. Future research prospects

include the experimental testing of the model and the evaluation of its effectiveness under different educational conditions.

References

1. Achilova F.K. “E-Grafik” mobil ilovasini ishlab chiqish yordamida xizmat ko‘rsatish samaradorligini oshirish. O‘zbekistonda fanlararo innovatsiyalar va ilmiy tadqiqotlar jurnali. Vol. 3 No. 35, 2024.
2. Isomiddinov M.U. Dasturlash tillarini o‘qitish jarayonida talabalarning raqamli-texnologik kompetentligini rivojlantirishning nazariy-metodologik asoslari. Development Of Science 2026 / 2 Issue 2. Volume 1.
3. Achilova F.K. Arduino platformasi yordamida “Sanoq” dasturiy ta’minotini ishlab chiqish va tadbiq etishning ahamiyati. O‘zbekistonda fanlararo innovatsiyalar va ilmiy tadqiqotlar jurnali. Vol. 3 No. 35, 2024.
4. Isomiddinov M.U. & Murodova Z.R. (2026). Dasturlash fanlarini o‘qitish misolida raqamli va texnologik kompetentlikni oshirish. Development Of Science, 2(4), pp. 36-45.
5. Bobojonova M.A. Python dasturlash tili. O‘quv qo‘llanma. “Durdona” nashriyoti. Buxoro. 2023.
6. Javlon Abdullo. Mukammal dasturlash. 1-kitob: HTML va CSS. “Akademnashr” nashriyoti. Toshkent. 2021.
7. Vuorikari, R., Kluzer, S., & Punie, Y. The Digital Competence Framework for Citizens (DigComp 2.2): With New Examples of Knowledge, Skills and Attitudes. Luxembourg: Publications Office of the European Union. 2022.
8. UNESCO. ICT Competency Framework for Teachers (ICT-CFT), Version 3. Paris: UNESCO. 2023.