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DEVELOPMENT OF THE PROFESSIONAL AND METHODOLOGICAL CAPACITY OF FUTURE COMPUTER SCIENCE TEACHERS THROUGH THE USE OF INFORMAL EDUCATION TECHNOLOGIES

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Abstract

This article analyzes the didactic potential of informal education technologies in developing the professional and methodological capacity of future computer science teachers. The importance of informal education in ensuring continuous professional development of teachers within the modern digital educational environment is highlighted, and its main forms and tools are described. The study examines the impact of educational activities organized through online learning platforms, open educational resources, professional communities, webinars, and social networks on the development of professional competence among future computer science teachers. Furthermore, it is substantiated that the use of informal education technologies contributes to the formation of self-directed learning skills, improvement of methodological training, and enhancement of digital competencies. The findings of the study may serve as a methodological basis for developing scientific and methodological recommendations aimed at improving the process of preparing future computer science teachers for professional activity.



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Keywords: Informal education, future computer science teacher, professional competence, methodological competence, professional capacity, methodological capacity, self-directed learning, online learning platforms, open educational resources, continuous professional development, educational technologies.

РАЗВИТИЕ ПРОФЕССИОНАЛЬНОГО И МЕТОДИЧЕСКОГО ПОТЕНЦИАЛА БУДУЩИХ УЧИТЕЛЕЙ ИНФОРМАТИКИ ПОСРЕДСТВОМ ИСПОЛЬЗОВАНИЯ ТЕХНОЛОГИЙ ИНФОРМАЛЬНОГО ОБРАЗОВАНИЯ

Аннотация

В данной статье проанализированы дидактические возможности технологий неформального образования в развитии профессионального и методического потенциала будущих учителей информатики. Раскрыта значимость неформального образования в обеспечении непрерывного профессионального развития педагогов в условиях современной информационно-образовательной среды, а также охарактеризованы его основные формы и средства. В исследовании изучено влияние образовательной деятельности, организованной посредством онлайн-платформ, открытых образовательных ресурсов, профессиональных сообществ, вебинаров и социальных сетей, на развитие профессиональной компетентности будущих учителей информатики. Кроме того, обосновано, что использование технологий неформального образования способствует формированию навыков самостоятельного обучения, совершенствованию методической подготовки и развитию цифровых компетенций. Результаты исследования могут служить методологической основой для разработки научно-методических рекомендаций по совершенствованию процесса подготовки будущих учителей информатики к профессиональной деятельности.



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Ключевые слова: информальное образование, будущий учитель информатики, профессиональная компетентность, методическая компетентность, профессиональный потенциал, методический потенциал, самостоятельное обучение, онлайн-образовательные платформы, открытые образовательные ресурсы, непрерывное профессиональное развитие, образовательные технологии.

INFORMAL TA'LIM TEXNOLOGIYALARIDAN FOYDALANISH ORQALI BO'LAJAK INFORMATIKA O'QITUVCHILARINING KASBIY VA METODIK SALOHIYATINI RIVOJLANTIRISH

Annotatsiya

Ushbu maqolada bo'lajak informatika o'qituvchilarining kasbiy va metodik salohiyatini rivojlantirishda informal ta'lim texnologiyalarining didaktik imkoniyatlari tahlil qilingan. Zamonaviy axborotlashgan ta'lim muhitida o'qituvchilarning uzluksiz kasbiy rivojlanishini ta'minlashda informal ta'limning ahamiyati yoritilib, uning asosiy shakllari va vositalari tavsiflangan. Tadqiqotda onlayn ta'lim platformalari, ochiq ta'lim resurslari, professional hamjamiyatlar, webinarlar hamda ijtimoiy tarmoqlar orqali tashkil etiladigan o'quv faoliyatining bo'lajak informatika o'qituvchilarining kasbiy kompetentligini rivojlantirishga ta'siri o'rganilgan. Shuningdek, informal ta'lim texnologiyalaridan foydalanish o'quvchilarning mustaqil ta'lim olish ko'nikmalarini shakllantirish, metodik tayyorgarligini takomillashtirish va raqamli kompetensiyalarini rivojlantirishga xizmat qilishi asoslab berilgan. Tadqiqot natijalari bo'lajak informatika o'qituvchilarini kasbiy faoliyatga tayyorlash jarayonini takomillashtirishga oid ilmiy-metodik tavsiyalar ishlab chiqish uchun metodologik asos bo'lib xizmat qiladi.



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Kalit soʻzlar: informal taʼlim, boʻlajak informatika oʻqituvchisi, kasbiy kompetentlik, metodik kompetentlik, kasbiy salohiyat, metodik salohiyat, mustaqil taʼlim, onlayn taʼlim platformalari, ochiq taʼlim resurslari, uzluksiz kasbiy rivojlanish, taʼlim texnologiyalari.

Introduction

The digital transformation taking place in the education system today, the rapid development of information and communication technologies, and the rapid increase in the volume of knowledge are creating new requirements for the professional training of pedagogical personnel. In particular, in the process of training informatics teachers, it is important to develop not only their knowledge and skills in the subject, but also the application of modern pedagogical approaches, the effective use of digital tools, and the formation of competencies for independent professional development[1].

While traditional education in higher education institutions plays an important role in ensuring the professional training of future computer science teachers, it does not always have the ability to fully cover the rapidly changing needs of the modern labor market and the education system. Therefore, there is an increasing need to effectively use informal learning opportunities, along with formal and non-formal forms of education. Informal education serves to acquire knowledge, skills and competencies through a person's daily activities, professional communication, independent learning and the use of various digital resources[2]. Today, Coursera, Udemy, edX, YouTube, GitHub, professional forums, social networks, and various online communities are becoming important informal learning sources for future computer science teachers. Through these resources, they have the opportunity to independently master new knowledge in programming, information technology, artificial intelligence, information security, and computer science teaching methodologies. As a result, students



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develop competencies in independent learning, problem solving, critical thinking, and innovative activity.

The issue of using informal educational technologies in developing the professional and methodological potential of future computer science teachers is relevant from a scientific and pedagogical point of view. Because these technologies create the opportunity for continuous learning in accordance with the individual needs, interests and areas of professional development of learners. At the same time, they are an effective means of forming digital competencies required in a modern educational environment[3].

The purpose of this article is to analyze the potential of informal educational technologies in developing the professional and methodological potential of future computer science teachers and to highlight the pedagogical aspects of their use.

Analysis of relevant sources

A number of scientific studies have been conducted by domestic and foreign scientists on the development of professional competence of future teachers, the study of the pedagogical possibilities of continuing education and informal education. In particular, the scientific works of such scientists as A. Abdukodirov, U. Begimkulov, M. Aripov, N. Muslimov, B. Khodjayev in the field of pedagogical science of Uzbekistan cover the issues of using information and communication technologies, developing professional competence of teachers, and introducing innovative approaches to the educational process. These studies have developed pedagogical foundations for organizing independent educational activities of future teachers and using digital educational resources[4].

Theoretical and methodological aspects of informal education have been extensively studied in the scientific research of foreign scholars M. Knowles, P. Jarvis, A. Tough, V. Marsick and K. Watkins. In their works, informal education is interpreted as a form of learning that occurs naturally in the process of a



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person's daily activities, professional experience and social communication. Researchers emphasize the importance of informal education in the formation of continuous professional development, independent learning and lifelong learning competencies[5].

Research methodology

This study used a comprehensive methodological approach to study the potential of informal educational technologies in developing the professional and methodological potential of future computer science teachers. In the research process, theoretical and empirical research methods were combined, allowing for a comprehensive analysis of pedagogical phenomena. This approach made it possible to determine the impact of informal educational technologies on the professional development of teachers and assess their methodological significance[6].

The theoretical methods of the study were the analysis of scientific-pedagogical, psychological and methodological literature, comparative analysis, generalization and systematic approach methods. Local and foreign scientific sources on informal education, continuous professional development, digital competencies and computer science education were studied, and existing scientific views were analyzed. Also, the role of online educational platforms, open educational resources and professional communities in developing the professional and methodological potential of future computer science teachers was clarified.

Empirical research methods included observation, questionnaires, and interviews. These methods were used to study the level of students' use of informal educational resources, their independent learning activities, their motivation for professional development, and the development of their digital competencies. Based on the data obtained, the impact of informal educational technologies on

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the professional and methodological preparation of future computer science teachers was analyzed[7].

Methods of statistical analysis and pedagogical interpretation were used to process and summarize the research results. This made it possible to ensure the reliability of the results obtained, identify the advantages of informal educational technologies, and develop scientific and methodological conclusions on their integration into the process of training future computer science teachers.

This methodological approach serves to comprehensively assess the potential of informal educational technologies in developing the professional and methodological potential of future computer science teachers and to develop scientific and practical recommendations aimed at improving this process.

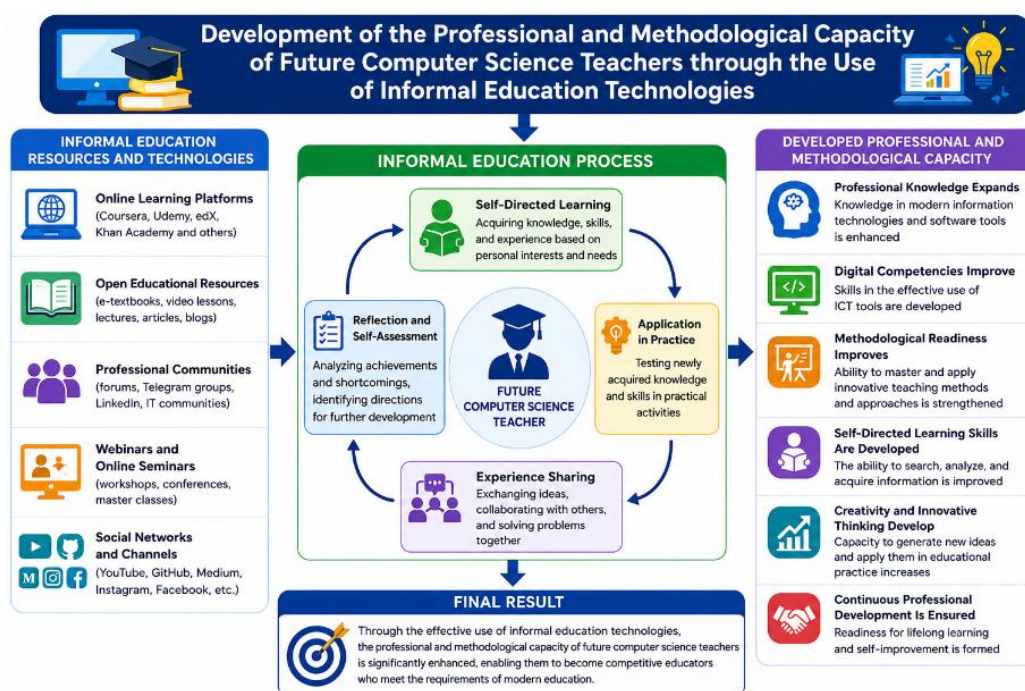


Figure 1. Model for developing the professional and methodological potential of future computer science teachers through the use of informal educational technologies

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Figure 1 above shows the mechanism of influence of informal educational technologies on the professional and methodological potential of future computer science teachers. It shows the relationship between the main stages of the informal educational process and the competencies formed as a result of them. [8].

Analysis and results

This study analyzed the possibilities of developing the professional and methodological potential of future computer science teachers through the use of informal educational technologies from a pedagogical perspective. Relevant scientific sources, modern educational platforms, and innovative approaches used in the practice of computer science education were studied and their impact on the training of future teachers was assessed.

1. Pedagogical opportunities for using informal educational resources

Analysis shows that in the modern digital educational environment, online courses, open educational resources, video lessons, professional communities and social networks are expanding the opportunities for future computer science teachers to independently enrich their knowledge. Through these resources, students have the opportunity to acquire knowledge that meets their individual needs and interests, learn new technologies and develop skills necessary for professional activity.

2. The impact of informal educational technologies on professional potential

Analysis of scientific literature and existing experiences has shown that informal educational technologies are an important factor in developing the professional potential of future computer science teachers. In particular, the processes of independent learning, search for new knowledge and its application in practice serve to strengthen the professional competence of students. The informal educational environment creates an opportunity to enrich the theoretical



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knowledge obtained during the educational process with real practical experience.

3. The role of informal educational technologies in the development of methodological capacity

The analysis revealed that participation in webinars, online seminars, pedagogical forums and professional communities has a positive impact on the development of methodological training of future computer science teachers. As a result of such activities, students gain additional experience in the use of modern pedagogical technologies, interactive methods and digital tools. They also have the opportunity to learn advanced pedagogical practices and adapt them to their activities[9].

4. General results

Based on the conducted analysis, the following results were achieved:

- Informal educational technologies are an important factor in developing the professional and methodological potential of future computer science teachers;
- online educational platforms and open educational resources support students' independent learning activities and create favorable conditions for continuous professional development;
- exchange of experience through professional communities and digital communication tools serves to develop methodological competencies;
- effective use of informal educational technologies allows developing digital competencies, innovative thinking, and professional flexibility of future computer science teachers.

The results of the study show that integrating informal educational technologies into the training process of future computer science teachers helps develop their professional and methodological potential, activate independent educational activities, and effectively operate in a modern educational environment.

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Conclusions and suggestions

The results of the study showed that informal educational technologies in a modern educational environment are one of the important factors in developing the professional and methodological potential of future computer science teachers. Educational activities organized through online educational platforms, open educational resources, professional communities, webinars and social networks expand the opportunities for students to independently learn, regularly update their professional knowledge, and master modern pedagogical and digital technologies.

The analysis revealed that informal educational technologies serve to develop professional competence, methodological competence, digital literacy, and innovative thinking skills in future computer science teachers. These technologies also shape students' need for continuous professional development and increase their adaptability to the modern educational environment.

Based on the research, the following proposals were developed:

- ❖ Systematically integrate informal educational technologies into the professional training of future computer science teachers in higher education institutions;
- ❖ orient students to the effective use of Coursera, edX, Udemy, Khan Academy and other open educational platforms;
- ❖ expand opportunities for sharing experiences by encouraging participation in professional communities, pedagogical forums and digital educational networks;
- ❖ create a database of digital resources and methodological recommendations that support independent learning activities;
- ❖ introduce special modules and practical exercises on the use of informal educational tools in computer science teacher training programs[10].

In conclusion, the effective use of informal educational technologies serves to develop the professional and methodological potential of future computer science

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teachers, to form them as competitive specialists in a modern educational environment, and to ensure their continuous professional development.

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