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IMPROVEMENT OF METHODOLOGICAL APPROACHES IN THE TRAINING OF FUTURE COMPUTER SCIENCE TEACHERS

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Abstract
This article examines the importance of methodological approaches in training future computer science teachers, their adaptation to modern educational requirements, and effective ways to integrate them into the educational process. The study developed proposals for pedagogical technologies, innovative teaching methods, the use of digital resources, and methodological support for practical classes. The advantages of a constructive approach, active learning methods, and a problem-based learning curriculum in developing the professional competencies of computer science teachers are analyzed. The paper presents methodological recommendations for improving the effectiveness of education and analyzes important aspects of their contribution to the modernization of teaching.

Keywords: Digital technologies, information, cloud technologies, digital educational resources, educational portals, artificial intelligence, didactic principles, competencies, knowledge, skills and qualifications.

Introduction

As the system of continuous education undergoes fundamental changes, special attention is being paid to training modern computer science teachers, a field that is constantly evolving. This process is significantly influenced not only by pedagogical and methodological components, but also by the rapidly changing digitalization of education. Today, education is unimaginable without digital tools, and their use is becoming crucial for ensuring the timeliness, relevance, and innovation of education.

The use of digital educational technologies in educational activities increases student interest in the study of natural sciences, presenting new topics clearly and promoting better learning. This also opens up additional opportunities for future

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teachers to utilize digital technologies and resources for further professional development, as well as provides the opportunity to interact with the internet.

As a result, the professional training of future computer science teachers at higher education institutions is being developed at a level that meets the needs of schools. This is undoubtedly driven by the need for highly qualified specialists capable of actively participating in the modernization of the educational process and utilizing computer-based learning tools and internet resources in their work.

Thus, in the modern educational process, computer science teachers have become specialists who not only teach programming, algorithms, and systems thinking, but also guide students in such broad areas as digital literacy, information security, artificial intelligence, and cloud technologies. Therefore, when training future computer science teachers, it is important to have a thorough mastery of modern educational technologies and to apply them methodically and competently.

Literature reviyew. In the context of the revolutionary development processes taking place in education today, improving methodological approaches to training future computer science teachers is one of the main requirements of modern education, which includes the formation of not only technical skills, but also pedagogical, methodological, communicative and innovative competencies. Based on the above ideas and the research problem, a number of scientific studies of our country and foreign scientists were analyzed. In particular, aspects such as the theoretical foundations of educational technologies, methods and means of their application in modern education, self-development, professional and personal development of teachers were studied by A.A. Omonov[1], A.I. Tillayev[2], R.A. In the studies of Ruziyev[3], U.Mirsanov[4], O.T.Muratov, Z.Sh.Sharipova, S.H.Kurisheva[5], S.N.Lebedova[6], B.R.Mandel[7], Z.Kh.Saidova[8], and the study of methodological and systematic approaches to the training of computer science teachers, which were thoroughly studied by I. Verbovskyi, A. Melnyk[9], D.A. Kazimova[10], etc., the problems of improving the knowledge and skills of future teachers in the use of technology should not only be directed towards teaching technology, but also towards its application in accordance with pedagogical goals - interactivity, motivation, critical thinking, and creative problem-solving, were not fully reflected.

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Research methodology. Thus, the rapid development of digital technologies necessitates the need to improve the professional training of future computer science teachers.

It is clear that for a future computer science teacher, it is not enough to know only one programming language (for example, Pascal), which schoolchildren learn. Modern IT technologies based on the concept of objects require different thinking and innovative approaches, including in programming. Currently, object-oriented, generic, component-oriented and distributed programming technologies are widely used. However, there is a lack of methodological training, that is, computer science teachers mainly focus on technical skills, but do not know how to use modern educational technologies for pedagogical purposes. For example, there is a lack of special methodological instructions and practical exercises on how to methodically build a lesson using tools such as Prezi, Google Classroom, Padlet, MS Teams - that is, how to correctly use them at the stages of motivation, explanation, reinforcement and assessment.

There is also a gap between theory and practice, that is, in higher education institutions, students are given more theoretical knowledge, and there are fewer practical exercises on how to use technologies in a real school environment. For example, when future teachers go on internships, they have difficulty if there are no computers, the Internet, a projector at school, or if the lesson plan is not adapted. In addition, there is a lack of knowledge about software tools and platforms, including the fact that a computer science teacher teaches only simple tools such as Windows, Word, PowerPoint, Scratch, but does not have sufficient knowledge and skills in modern LMS, CMS, e-learning environments, gamification platforms. For example, Moodle, Google Classroom, Quizizz, Kahoot, Discord, Github Classroom - these tools are relevant in the current educational environment, but there are few methodological approaches to integrating them.

Therefore, it is necessary to strengthen training in the methodology of using educational technologies in higher education and IT tools used in school lessons. In this regard, it is advisable to include modern online platforms and "mini-projects" on their use in the classroom in the training program for computer science teachers, as well as create a pedagogical methodological approach appropriate to each technology (for example, gamification tools → competition; forums → collegial analysis).

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Analysis and results

Based on the above considerations, we have studied the main aspects of improving methodological approaches. Below are the main aspects and solutions to existing problems in this direction.

1. Implementing an integrative approach:

• Teaching computer science in an integrated manner with other disciplines (mathematics, technology, physics), that is, providing knowledge based on a network approach.

• Students learn programming through solving practical problems (for example, modeling the solution of a physics problem through algorithmic modeling).

2. Training based on a competency-based approach:

• Formation of not only knowledge, but also practical skills and competencies:

- technical (programming, information systems);
- methodological (application of educational technologies);
- communicative (working with students);
- analytical (assessment, diagnostics of the learning process).

3. STEAM approach:

• Designing lessons through the integration of Science, Technology, Engineering, Art, Mathematics;

• Developing algorithmic thinking and decision-making in students in problem situations.

4. Creating a digital learning environment:

• Providing methodological skills in using platforms such as Moodle, Google Classroom, MS Teams;

• Teaching students to learn remotely, independently and collaboratively through digital tools.

5. Implementation of artificial intelligence and modern technologies:

• Practical tasks on using tools such as ChatGPT, Copilot, Scratch IT in the learning process;

• Learning to create tests, examples, lesson plans using IT.

Therefore, from the analysis and the results obtained, it became clear that the existing problems and their solutions in preparing future computer science teachers with qualified, innovative, and digital competencies based on modern educational technologies and methodological approaches can be explained as follows:

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Problem	Analysis	Solution
1. Superficial methodological knowledge	Computer science teachers often emphasize technical knowledge and do not know how to use technology methodically in the classroom.	Deepening the discipline of methodological application of educational technologies; lesson analysis, methodological seminars, and practical lesson construction should be taught.
2. Lack of practical training	How to use IT tools in a real school environment, how to work with students - these skills have not been developed.	Developing lesson models based on innovative technologies during internships; conducting trainings, workshops, and test lessons.
3. Lack of a flexible learning environment	Many universities still lack computers, internet, and software.	Digital laboratories for universities, use of cloud services (Google Colab, Replit); infrastructure support from the state**.**
4.Teaching IT and modern technologies superficially	Theoretical information about IT tools is provided, but practical application (preparation of educational materials, analysis) is not taught.	Tasks on mini-projects, lesson plans, chatbot creation, and code generation based on IT tools.
5. Lesson design skills are weak	There is little knowledge of methodological lesson design (stages, tools, methods).	Introducing the subject of "lesson construction"; teaching based on lesson design templates, examples, and analysis.

Conclusion

The system of using educational technologies and methodological approaches for future teachers, how to use them for pedagogical purposes and improve their skills, will serve as a basis for modernizing existing forms, methods and didactic principles of organizing an effective educational process, as well as developing new ones. In particular:

1. Pedagogical and technical training should be combined - a computer science teacher should not just be a code writer, but a modern educator.
2. The methodological use of educational technologies must be taught - the main question should not be how to use technology, but when, for what purpose, in what pedagogical style to use it.
3. Step-by-step mastery of innovative technologies - Gradually introduce into practice such technologies as artificial intelligence, digital assessment, gamification, learning analytics.

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4. Strengthening university-school cooperation - creating opportunities for students to use technologies learned in real schools; organizing model lessons and experiments on the basis of schools.

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