PROBLEMS AND MODERN SOLUTIONS OF TEACHING COMPUTER SCIENCE IN SCHOOLS

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https://doi.org/10.5281/zenodo.15385853

Abstract

This article explores the current challenges in teaching computer science in schools and presents innovative solutions to improve the learning process. It analyzes several pressing issues such as the lack of methodological resources, limited technical capacity, and inconsistent content delivery. Furthermore, the paper highlights the advantages of integrating modern digital platforms—particularly Quizizz.com—into classroom instruction. The article demonstrates how such tools can foster independent thinking, analytical skills, collaboration, and active participation among students. Based on both analytical and practical perspectives, the paper outlines specific strategies to make the teaching of informatics more interactive, efficient, and engaging.

Keywords

Computer science, education, innovative methods, Quizizz.com, quiz-based learning, gamification, digital technology, interactive instruction, independent thinking, online platform.

Literature Review

The literature reviewed in this study reveals a number of ongoing challenges in teaching computer science at the school level, as well as the significance of these challenges in today's educational landscape. The subject of computer science has gained importance not only because of its technical applications but also due to its role in developing analytical thinking and practical skills.

Importantly, computer science is no longer limited to coding; it is now considered a standalone discipline focused on processing information and understanding its structure. Although the subject is entering a new phase in school education, several issues remain. These include a shortage of methodological resources, rapid obsolescence of materials, insufficient computer equipment, and the need for teachers to frequently retrain themselves—often from scratch every couple of years.

Computer science is closely linked to other disciplines such as mathematics, physics, and astronomy, and it plays a major role in fostering independent learning, creative thinking, and a broader technical worldview. Using computers in education requires not only theoretical knowledge but also practical application. Interestingly, some students may even possess more up-to-date technical knowledge than their teachers, which demands new and more flexible teaching approaches.

According to the reviewed sources, some of the most critical problems include the lack of unified teaching standards and textbooks, unequal access to computer technology among students, limited lesson time, and the need for constant curriculum updates [1]. As a response,

researchers recommend that teachers continuously develop their skills, incorporate distance learning options, and emphasize hands-on training.

In a separate article focused on e-learning, the potential of digital technologies and online platforms to support computer science instruction is discussed. The author reviews three major platforms—Coursera, Universarium, and Stepik—and stresses the importance of moving beyond traditional methods to fully adopt digital learning. Online interaction, assessment, and feedback between teachers and students are shown to support stronger learning outcomes [2].

Other researchers emphasize the role of interactive methods in increasing student engagement, fostering creativity, and encouraging independent knowledge acquisition. Rather than relying solely on traditional instruction, modern pedagogy should integrate information technology tools throughout the learning process. Various interactive strategies—such as group activities, online quizzes, simulations, video tutorials, and educational games—have been shown to make learning more dynamic and effective.

However, a lack of technical infrastructure and limited internet access are still major obstacles to widespread implementation of interactive methods. Another important factor is teacher readiness—not all educators are confident or trained to use modern technologies in their lessons. Recommended solutions include improving technical infrastructure, offering retraining programs, and effectively using distance learning tools [3].

One particularly relevant study underscores that computer science is no longer just about programming; it also plays a central role in preparing students for real life. Unlike traditional teaching methods, modern approaches such as interactive, student-centered learning, project-based instruction, distance education, and gamified formats offer more flexibility and engagement.

One of the most compelling arguments is that students should not be passive listeners, but active problem-solvers, creative thinkers, and collaborators. For example, block-based coding environments like Scratch or the use of simulations and virtual labs have proven to be effective, especially for younger students [4].

These methods not only simplify instruction but also foster confidence, curiosity, and a desire to explore new ideas.

To create more engaging lessons, modern methods such as project-based learning, flipped classrooms, STEAM integration, and digital education platforms are recommended. These approaches not only deliver knowledge but also allow students to apply it independently and collaboratively [5]. For instance, developing a game in Scratch not only teaches coding but also strengthens creativity and teamwork skills.

Overall, these sources suggest that improving the teaching of computer science in schools is achievable through practical, scalable strategies. However, success also depends on the teacher's own commitment to growth. A teacher should not only deliver information but also act as a mentor and motivator who inspires students to go further.

Main Part

Analysis of the literature clearly shows that there are several pressing challenges in teaching computer science in schools today. One of the most common issues is the lack of textbooks and methodological resources, which leaves many teachers struggling to deliver lessons effectively. As a result, each teacher often conducts lessons based on their own ability and available tools, leading to inconsistencies in content delivery.

In the past, technological advancements occurred every 5–10 years. Today, new generations of technologies emerge every minute and are quickly integrated into real-life applications. This constant evolution means that teachers must continuously update their knowledge and skills to stay relevant. Without ongoing professional development, it becomes increasingly difficult to teach a subject as dynamic as computer science.

Another concern is the limited scope of computer science instruction in many schools, which often focuses solely on basic software like Word and Excel or simple coding tasks. However, the subject holds much greater potential—it can be used to cultivate critical thinking, problem-solving abilities, algorithmic thinking, collaboration, and creativity among students.

It is also important to recognize that each student learns at a different pace and has unique interests and strengths. Therefore, the teaching process must be flexible and adaptive. Online tools and testing platforms can help address this need by allowing students to learn at their own speed and revisit materials when necessary.

Given the increasing accessibility of smartphones among students, one effective solution is to integrate online quizzes using platforms like Quizizz.com. This approach allows students to assess their knowledge in real time, analyze problems, and develop logical reasoning skills through interactive learning. Quizizz.com not only makes learning fun but also encourages greater participation and motivation during lessons.

This platform transforms the learning experience by allowing students to evaluate themselves, reflect on their mistakes, and work toward improvement. It supports several critical learning goals:

Active learning – students engage directly with the material and strengthen their understanding through repeated exposure.

Analytical thinking – by answering quiz questions, students gain insight into their performance and learn from their errors.

Team collaboration – when quizzes are conducted in groups, students practice cooperation and communication.

The Quizizz-based teaching method offers several clear advantages:

Interactive environment – the quiz format encourages student participation and makes the classroom atmosphere more dynamic.

Gamification – lessons become more enjoyable by presenting traditional questions as fun challenges or games.

Automated grading – the platform provides instant feedback, saving time for teachers and helping students quickly identify their strengths and weaknesses.

Flexible use – quizzes can be conducted both in the classroom and remotely, making them suitable for hybrid or distance learning environments.

In practice, the process is simple: the teacher signs up for free, creates a custom quiz based on the lesson topic, and students participate using their phones, tablets, or computers. Afterward, the platform automatically evaluates each student's performance. Teachers can then analyze the results individually or collectively, using AI-assisted insights such as response speed, accuracy, and frequency of incorrect answers. Top-performing students are automatically highlighted at the end of each quiz session.

In summary, Quizizz.com presents a powerful and practical tool for making computer science education more interactive, personalized, and results-driven.

Conclusion

Based on the analysis and recommendations discussed above, it can be confidently stated that teaching computer science in a modern and effective way is not just about transferring knowledge. It is about shaping students' ability to think critically, act creatively, and navigate independently in a digital world. In today's rapidly changing technological environment, teachers must remain open to innovation, adaptable, and well-versed in digital tools. These qualities are especially essential for computer science educators.

Platforms like Quizizz.com offer a valuable and practical approach to transforming the learning process into an interactive, engaging, and student-centered experience. This method helps students not only test their knowledge, but also develop essential skills such as self-assessment, collaboration, and learning through competition. Features like gamification, real-time feedback, and automated evaluation significantly enhance lesson quality and student involvement.

Ultimately, the effective use of innovative digital tools in computer science education does more than make the subject accessible—it lays the foundation for preparing a generation of digitally literate, confident, and capable individuals ready to meet the demands of the future. By embracing such approaches, educators take an important step toward building a smarter, more tech-savvy society.

References:

1.Потешкина Г.В. (2015). Современные проблемы в преподавании информатики. Актуальные проблемы гуманитарных и естественных наук, (4-2), 136-139.

2.Горбачева, Ю. В. Использование электронного обучения при преподавании информатики / Ю. В. Горбачева // Актуальные проблемы модернизации математического и естественно-научного образования : Сборник научных трудов по материалам Всероссийской научно-методической конференции, Балашов, 17 мая 2018 года / Под редакцией М. А. Ляшко. – Балашов: Издательство "Саратовский источник", 2018. – С. 59-61. – EDN XWKOUX.

3.To'raqulovich Murodov, O. (2024). INFORMATIKA DARSLARINI INTERAKTIV METODLAR YORDAMIDA TASHKIL ETISH. The Latest Pedagogical and Psychological Innovations in Education , 1(2), 101–107. Retrieved from https://incop.org/index.php/th/article/view/439

4.Qodirov, F. ., & Shodiyev , M. . (2025). INFORMATIKA FANINI O'QITISHDA ZAMONAVIY YONDASHUVLAR. Наука и инновация, 3(7), 96–100. извлечено от https://inlibrary.uz/index.php/scin/article/view/76051

5.Murodov Oybek To'raqulovich. (2025). INFORMATIKA FANINI O'QITISH METODIKASI FANINI INNOVATSION YONDASHUV ASOSIDA O'QITISH METODIKASI. New Modern Researchers: Modern Proposals and Solutions, 2(4), 77–83. Retrieved from https://incop.org/index.php/new/article/view/1300.