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Interactive Technologies in Teaching Computer Science

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Abstract. This article examines the effectiveness of interactive technologies in teaching Computer Science Education. The study explores the role of multimedia tools, online learning platforms, virtual laboratories, and interactive teaching methods in improving students’ academic performance and motivation. Both qualitative and quantitative research methods were applied, including classroom observations, questionnaires, and interviews with teachers and students. The findings indicate that interactive technologies increase student engagement, enhance understanding of complex computer science concepts, and develop important skills such as problem-solving, critical thinking, and collaboration. The study also identifies several challenges related to technical resources and teacher preparedness. Overall, the research confirms that the integration of interactive technologies contributes significantly to the modernization and effectiveness of computer science education.

Keywords: interactive technologies, computer science education, digital learning, multimedia tools, online platforms, student engagement, programming education, educational technology, algorithmic thinking, teaching methods.

The rapid development of Information Technology has significantly transformed modern education, especially in the teaching of Computer Science Education. Traditional teaching methods are gradually being replaced by interactive technologies that encourage active student participation, collaboration, and practical learning experiences. Interactive tools such as multimedia presentations, virtual laboratories, online coding platforms, and educational software help students understand complex computer science concepts more effectively. These technologies also increase learners’ motivation and interest by creating a more engaging and student-centered learning environment.

In recent years, educators and researchers have paid increasing attention to the effectiveness of interactive technologies in improving the quality of computer science education. The integration of digital tools into informatics lessons supports the development of problem-solving, algorithmic thinking, and programming skills among students. Moreover, interactive teaching methods allow teachers to provide immediate feedback, organize collaborative activities, and adapt learning materials to students’ individual needs. Therefore, studying the effectiveness of interactive technologies in teaching computer science is important for identifying modern pedagogical approaches that can enhance students’ academic performance and digital competence.

Many researchers in the field of Computer Science Education have emphasized the positive impact of interactive technologies on students’ learning outcomes and engagement. Previous studies have shown that the use of multimedia tools, interactive simulations, and online educational platforms helps students better understand abstract programming and algorithmic concepts. According to educational researchers, interactive learning environments increase students’ motivation and encourage independent learning. In addition, the integration of digital technologies into informatics classes improves communication between teachers and students, making the learning process more collaborative and effective.

Several scholars have also investigated the role of interactive teaching methods in developing practical and analytical skills in computer science education. Research

findings indicate that project-based learning, gamification, and virtual laboratories contribute to the improvement of students' critical thinking and problem-solving abilities. Furthermore, studies reveal that interactive technologies enable teachers to adapt instructional materials according to students' individual learning styles and levels of knowledge. Despite these advantages, some researchers note challenges such as limited technical resources, insufficient teacher training, and unequal access to digital devices, which may affect the successful implementation of interactive technologies in schools.

This study employed a qualitative and quantitative research methodology to examine the effectiveness of interactive technologies in teaching Computer Science Education. Data were collected through classroom observations, student questionnaires, and interviews with computer science teachers from secondary schools. In addition, comparative analysis was conducted between traditional teaching methods and interactive technology-based instruction to evaluate differences in students' academic performance, participation, and motivation. Various interactive tools, including multimedia presentations, online programming platforms, and virtual learning applications, were used during the experimental lessons. The collected data were analyzed using descriptive and comparative methods to identify the advantages and challenges of integrating interactive technologies into computer science education.

The results of the study demonstrated that the use of interactive technologies significantly improved students' engagement and academic performance in Computer Science Education classes. Students who participated in technology-based lessons showed greater interest in programming tasks, problem-solving activities, and collaborative projects compared to those taught through traditional methods. Classroom observations revealed that multimedia presentations, coding platforms, and virtual simulations helped learners understand difficult concepts more quickly and effectively. Furthermore, questionnaire responses indicated that most students found interactive lessons more motivating, enjoyable, and easier to follow.

The discussion of the findings suggests that interactive technologies play an important role in creating a student-centered learning environment. These tools not only enhance theoretical understanding but also develop practical skills such as algorithmic thinking, creativity, and teamwork. Teachers reported that interactive methods increased classroom participation and allowed them to provide immediate feedback to students. However, the study also identified several challenges, including limited access to digital equipment, unstable internet connections, and the need for additional teacher training in educational technologies. Despite these difficulties, the overall findings confirm that integrating interactive technologies into computer science teaching can positively influence the quality and effectiveness of education.

In conclusion, the study confirms that interactive technologies have a positive impact on the teaching and learning process in Computer Science Education. The use of multimedia tools, online platforms, and virtual learning applications increases students' motivation, classroom participation, and understanding of complex computer science concepts. Interactive teaching methods also contribute to the development of important skills such as critical thinking, problem-solving, collaboration, and algorithmic reasoning. These findings demonstrate that technology-based instruction can improve the overall quality and effectiveness of informatics education.

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