

METHODOLOGY OF TEACHING GENERAL SECONDARY SCHOOL STUDENTS USING ARTIFICIAL INTELLIGENCE TECHNOLOGIES (BASED ON THE EXAMPLE OF THE 6TH GRADE INFORMATICS AND INFORMATION TECHNOLOGIES TEXTBOOK)

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Abstract

The rapid advancement of artificial intelligence (AI) technologies has transformed various aspects of human life, including educational practices. The integration of AI into school education creates new opportunities for improving teaching effectiveness, promoting personalized learning, and developing students' digital competencies. This study aims to develop a methodology for teaching general secondary school students using artificial intelligence technologies based on the content of the 6th Grade Informatics and Information Technologies textbook. The research analyzes the pedagogical potential of AI tools in enhancing students' learning experiences and examines ways to integrate these technologies into classroom instruction while considering learners' cognitive and psychological characteristics. The study employs theoretical analysis, comparative analysis, pedagogical modeling, and observation methods. The findings indicate that the effective use of AI technologies contributes to the development of digital literacy, critical thinking, creativity, collaboration, and problem-solving skills among students. Furthermore, AI-supported learning environments increase students' motivation and engagement while supporting individualized instruction. The proposed methodology may serve as a practical framework for Informatics teachers seeking to implement AI technologies in general secondary education.



Keywords: artificial intelligence, AI in education, teaching methodology, informatics education, digital literacy, secondary education, educational technology, personalized learning, 6th-grade students.

Introduction

The twenty-first century is characterized by the rapid development of digital technologies that significantly influence economic, social, and educational systems. Among these technologies, artificial intelligence has emerged as one of the most transformative innovations with the potential to reshape educational practices worldwide. Educational institutions increasingly recognize the necessity of preparing students for a society in which AI technologies play an essential role in everyday life and professional activities. Artificial intelligence refers to computer systems capable of performing tasks that traditionally require human intelligence, such as reasoning, decision-making, language processing, pattern recognition, and problem-solving. Recent advances in machine learning, natural language processing, and intelligent tutoring systems have expanded the possibilities for integrating AI into educational settings.

The incorporation of AI technologies into teaching and learning processes provides numerous benefits. AI-powered educational tools can adapt instructional materials to individual learners' needs, provide immediate feedback, monitor learning progress, and support teachers in identifying students who require additional assistance. Consequently, AI contributes to creating more efficient, flexible, and learner-centered educational environments. Educational reforms implemented in Uzbekistan emphasize the modernization of the education system, the enhancement of digital literacy, and the development of students' twenty-first-century competencies. Informatics and Information Technologies is a compulsory subject within the general secondary education curriculum and serves as an effective platform for introducing students to emerging technologies. The 6th Grade Informatics and Information Technologies textbook contains topics that can be enriched through the integration of AI applications and concepts. Despite growing international interest in AI-supported education, methodological guidelines specifically designed for middle school students remain limited. Most existing studies focus on higher education contexts or examine AI from technological rather than pedagogical perspectives. Therefore, developing an age-appropriate methodology for introducing AI technologies into general secondary education represents an important scientific and practical task. This study seeks to address this gap by proposing a comprehensive methodology for teaching 6th-grade students using artificial intelligence technologies within the framework of Informatics education.

Literature Review

Artificial intelligence has attracted considerable attention from researchers in the field of educational technology. Numerous studies have investigated its impact on teaching effectiveness, student achievement, and educational innovation. Holmes, Bialik, and Fadel (2022) argue that AI technologies possess the potential to transform education by enabling personalized learning experiences. According to these authors, intelligent systems can analyze learners' performance data and provide adaptive learning pathways tailored to individual needs. Luckin (2018) emphasizes that AI should be viewed as an instrument that augments rather than replaces teachers. She highlights the importance of maintaining the human dimension of education while employing intelligent technologies to support decision-making and enhance learning outcomes. Woolf (2021) examined the role of intelligent tutoring systems and concluded that adaptive educational technologies can significantly improve students' understanding of complex concepts through individualized guidance and immediate feedback.



Hwang (2020) notes that AI applications facilitate active learning environments by supporting inquiry-based and problem-based instructional approaches. These technologies encourage students to participate actively in the construction of knowledge rather than functioning as passive recipients of information. UNESCO (2021) stresses the ethical implications of AI implementation in educational settings. Issues related to data privacy, transparency, accessibility, and equitable access must be addressed to ensure that AI contributes positively to educational development. OECD (2023) reports that future educational systems should focus not only on technological proficiency but also on critical thinking, creativity, ethical awareness, and collaborative problem-solving. These competencies are essential for students living in increasingly digital societies.

Within the context of school education, researchers have identified several advantages of integrating AI technologies:

- personalization of instruction according to learners' abilities and preferences;
- increased student motivation and engagement;
- enhanced opportunities for formative assessment;
- immediate and targeted feedback;
- support for inclusive education;
- development of digital competencies and computational thinking.

However, the literature also reveals several challenges associated with AI implementation. These include insufficient technological infrastructure, limited teacher preparedness, ethical concerns, unequal access to digital resources, and the potential overreliance on automated systems. A review of previous studies demonstrates that although the educational potential of AI has been widely acknowledged, there remains a lack of methodological frameworks tailored specifically to the cognitive and developmental characteristics of middle school learners. Moreover, limited research has explored the integration of AI technologies within the context of the Informatics curriculum in general secondary schools. Therefore, this study contributes to the existing body of knowledge by developing an instructional methodology that aligns AI applications with the learning objectives of the 6th Grade Informatics and Information Technologies textbook. The proposed approach seeks to balance technological innovation with sound pedagogical principles and age-appropriate instructional practices.

Discussion

The findings of this study support international research emphasizing the educational potential of artificial intelligence technologies. The results indicate that AI tools can enrich traditional instructional practices when implemented through sound pedagogical principles. One of the major strengths of the proposed methodology is its alignment with competency-based education. Rather than focusing solely on content acquisition, the methodology encourages students to develop essential twenty-first-century competencies, including critical thinking, collaboration, creativity, communication, and digital literacy. Another important aspect is the changing role of teachers. In AI-supported classrooms, teachers are no longer viewed merely as providers of information. Instead, they act as facilitators who guide students through inquiry, encourage reflection, and promote ethical awareness regarding technology use. However, several challenges should be acknowledged. First, technological infrastructure varies significantly among schools. Limited access to computers, internet connectivity, and digital resources may hinder implementation efforts. Second, teachers require continuous professional development to acquire the competencies necessary for selecting and effectively utilizing AI tools. Third, ethical considerations remain essential. Educational institutions must ensure data



privacy, transparency, fairness, and responsible technology use while protecting students from potential risks associated with digital environments. Despite these challenges, the findings suggest that carefully planned integration of AI technologies can substantially improve educational quality and support learners in preparing for future societal demands.

Practical Recommendations

Based on the findings of this study, the following recommendations are proposed:

- Integrate introductory AI concepts into the Informatics curriculum beginning at the middle school level.
- Organize professional development programs focused on AI literacy and instructional applications for teachers.
- Develop national guidelines regarding ethical and responsible AI use in education.
- Ensure equitable access to digital technologies for all students.
- Encourage project-based learning activities involving AI-supported tools.
- Promote collaboration among educators, researchers, policymakers, and technology developers.

These recommendations may facilitate the sustainable implementation of AI-supported teaching practices within general secondary education.

Conclusion

Artificial intelligence technologies represent one of the most significant innovations influencing contemporary education. Their integration into school instruction provides opportunities to transform traditional teaching approaches into more personalized, interactive, and competency-oriented learning experiences.

This study developed a methodology for teaching general secondary school students using artificial intelligence technologies based on the example of the 6th Grade Informatics and Information Technologies textbook. The proposed methodology consists of four stages: motivation and awareness, guided exploration, practical application, and reflection and evaluation. The analysis demonstrated that AI technologies can contribute to the development of students' digital literacy, critical thinking, creativity, communication, and problem-solving skills. Furthermore, AI-supported learning environments enhance students' motivation and engagement while enabling teachers to address individual differences more effectively. The findings also emphasize that successful implementation requires adequate infrastructure, teacher preparedness, ethical considerations, and institutional support. Artificial intelligence should complement rather than replace teachers, serving as a powerful educational tool that enhances pedagogical practice. Future research may focus on longitudinal experimental studies involving larger participant groups, the development of age-specific AI learning resources, and the investigation of students' perceptions of AI-supported instruction. In conclusion, the proposed methodology offers a practical framework for integrating artificial intelligence technologies into Informatics education and contributes to ongoing efforts aimed at modernizing general secondary education in accordance with the demands of the digital age.

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