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Evaluation of the Application Effect of Intelligent Teaching Systems in Mathematics Education

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ABSTRACT

With the rapid advancement of information technology, the Intelligent Teaching System (ITS) has emerged as a pivotal tool in mathematics education. This paper aims to evaluate the effectiveness of ITS by exploring its impact on personalized learning, increased student interaction and participation, intelligent assessment and feedback, teacher support, and resource optimization. Through a comprehensive analysis, the study examines the specific effects of ITS on student learning outcomes, satisfaction, and overall teaching efficiency. Focusing on key aspects such as adaptive learning pathways, real-time feedback, and enhanced engagement, this paper highlights how ITS can revolutionize traditional teaching approaches, thereby improving both teaching quality and student performance.

KEYWORDS

Intelligent Teaching System, Mathematics Education, Application, Effect Evaluation

INTRODUCTION

Mathematics education, as a cornerstone of basic education, plays a crucial role in fostering students' logical thinking, problem-solving abilities, and scientific literacy. However, traditional mathematics teaching methods face numerous challenges such as addressing the diverse learning needs of students, optimizing the allocation of teaching resources, and improving overall learning efficiency (Dabingaya, 2022; Schukajlow et al., 2023). In response to these challenges, the rapid advancement of information technology has introduced the intelligent teaching system (ITS), which is gradually transforming the landscape of mathematics education (Mousavinasab et al., 2021).

An ITS leverages cutting-edge technologies, such as big data, artificial intelligence (AI), and machine learning (ML), to offer personalized learning experiences. By analyzing students' learning behaviors and adapting to their individual abilities, the ITS customizes content and adjusts the difficulty level to better meet each student's unique needs (Hwang & Tu, 2021). This tailored approach not only helps engage students and boost their interest in learning but also significantly enhances learning efficiency, enabling students to master mathematical concepts more effectively. Additionally, an ITS incorporates interactive technologies like virtual reality (VR) and augmented reality (AR), offering students more immersive and dynamic learning experiences. These interactive methods enhance student participation, increase motivation, and promote a deeper understanding and application of mathematical knowledge (Alam, 2022).

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Another significant feature of ITSs is their intelligent evaluation and feedback mechanisms. These systems assess students' learning progress in real-time, providing immediate, targeted feedback and corrective suggestions. By identifying and addressing learning gaps promptly, the ITS supports continuous improvement in students' learning strategies, thereby optimizing overall learning outcomes (Alrakhawi et al., 2023).

This paper seeks to evaluate the application and effectiveness of ITSs in mathematics education, addressing the following key research questions:

- How does the implementation of an ITS influence student engagement and motivation in mathematics education?
- What impact does the ITS have on students' learning outcomes in terms of understanding and mastering mathematical concepts?
- To what extent can the ITS improve the efficiency of teaching by addressing diverse learning needs and optimizing resource allocation?
- How do students and educators perceive the usability and effectiveness of the ITS in a mathematics classroom setting?

By answering these questions, the paper aims to provide valuable insights and recommendations for educators on how to effectively integrate an ITS into their teaching practices, as well as offer useful perspectives on the future development of ITSs in the field of mathematics education.

RELEVANT WORK

The integration of ITSs into education, particularly in mathematics, has garnered significant attention due to their transformative potential. As the education sector continues to evolve, the application of the ITS, powered by AI, ML, and big data, is reshaping traditional teaching and learning paradigms. A growing body of research has explored various aspects of the ITS in mathematics education, including personalized learning, adaptive feedback mechanisms, student engagement, and the optimization of teaching resources.

Personalized Learning and Adaptive Teaching

One of the most prominent features of an ITS is its ability to deliver personalized learning experiences tailored to individual student needs. This approach ensures that students are neither overwhelmed with difficult content nor bored with tasks that are too easy, maintaining an optimal level of challenge and engagement. AI-driven adaptive learning platforms can dynamically adjust content based on individual progress, leading to enhanced student outcomes. In mathematics, where concepts build upon one another, personalized learning systems can be especially beneficial. These platforms provide customized tasks based on prior knowledge and continuously adjust problem difficulty based on real-time performance data, ensuring students receive the appropriate level of support and challenge (Halkiopoulos & Gkintoni, 2024; Taylor et al., 2021).

Moreover, the ITS can effectively address varying levels of proficiency among students. By differentiating instruction, these systems can simultaneously support students who need extra help while challenging more advanced learners. Sophisticated AI algorithms enable continuous assessment of student understanding, providing real-time instructional adjustments to match student needs (Shemshack et al., 2021).

Intelligent Feedback and Assessment Mechanisms

A critical feature of an ITS is its ability to provide immediate and targeted feedback, which is essential for effective learning. Traditional classroom settings often suffer from delayed feedback,

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