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The Influence of AI Integration on Teaching Effectiveness: Examining Teacher Adoption, Ease of Use, Experience, and Student Interest

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ABSTRACT

Introduction: The integration of Artificial Intelligence (AI) in education has gained prominence in recent years, promising to revolutionize teaching and learning. However, the effectiveness of AI in education depends on factors such as teachers' adoption of AI technologies, ease of use, and their level of experience with AI tools. Additionally, student interest in learning may moderate the impact of AI on teaching effectiveness. This study explores how these factors—adoption, ease of use, and teacher experience—affect teaching effectiveness and the moderating role of student interest.

Methods: A survey-based quantitative approach was employed, with data collected from 250 teachers and 400 students across various educational institutions. Teachers were surveyed regarding their adoption of AI tools, perceived ease of use, and experience with AI technologies. Students were asked to assess their interest levels in learning through AI-based tools. Teaching effectiveness was measured using a combination of teacher self-assessment and student evaluations.

Results: The findings indicate that adoption and ease of use of AI tools positively correlate with teaching effectiveness. Additionally, teachers with higher experience in using AI report better teaching outcomes. Student interest was found to significantly moderate the relationship between AI adoption and teaching effectiveness, with higher levels of student interest amplifying the positive impact of AI.

Discussion: The study underscores the importance of teacher preparedness and familiarity with AI in enhancing teaching effectiveness. Moreover, the moderating role of student interest highlights the need to align AI-based learning tools with students' preferences to maximize engagement and learning outcomes.

Keywords: AI Integration in Education, Teaching Effectiveness, Teacher Adoption of AI, Ease of Use, Teacher Experience with AI, Student Interest in AI, Educational Technology, AI in Classroom Learning, Digital Pedagogy, Adaptive Learning Systems.

INTRODUCTION

The rapid advancement of Artificial Intelligence (AI) technologies has transformed various industries, and education is no exception. AI tools are increasingly being adopted to enhance the teaching-learning process, offering personalized learning experiences, automating administrative tasks, and providing insights into student performance. However, despite the growing adoption of AI in education, its effectiveness is contingent on several factors, particularly the adoption and ease of use of AI tools by teachers, as well as their experience in utilizing these tools.

Moreover, the role of students' interest in learning cannot be overlooked. Student interest plays a crucial role in determining the success of educational interventions. This study aims to explore the following key questions:

1.   How does the adoption of AI, the perceived ease of use, and teachers' experience with AI affect teaching effectiveness?

2.   What role does student interest play in moderating

the relationship between AI integration and teaching effectiveness?

This research seeks to fill the gap in literature by exploring how these factors interplay to influence teaching outcomes and to provide insights into how AI can be more effectively incorporated into educational settings.

Literature Review

AI Adoption and Teaching Effectiveness

The adoption of AI in educational settings has been shown to enhance teaching effectiveness by providing personalized learning experiences, improving content delivery, and facilitating better assessment methods. However, teachers' willingness to adopt AI is influenced by several factors, including perceived benefits, ease of use, and organizational support (Venkatesh et al., 2003). When teachers actively adopt AI technologies, they can tailor instruction to meet diverse student needs, thus improving teaching outcomes (Baker et al., 2019).

Ease of Use and Teaching Effectiveness

Ease of use is another significant factor in the effective integration of AI in teaching. If AI tools are complex or require extensive training, teachers may be reluctant to use them, thereby diminishing their potential effectiveness. The Technology Acceptance Model (TAM) suggests that the perceived ease of use directly influences the likelihood of technology adoption (Davis, 1989). Studies have shown that teachers who find AI tools easy to use are more likely to incorporate them into their teaching practices, resulting in higher teaching effectiveness (Liu et al., 2019).

Teachers' Experience with AI

Teachers' experience with AI tools also plays a critical role in the effectiveness of teaching. Teachers who have more experience with AI are better equipped to use these technologies to enhance their teaching strategies. AI allows for adaptive learning, which can be particularly beneficial for differentiated instruction. Experienced teachers are more likely to use AI in a way that aligns with their teaching goals, leading to better student outcomes (Ally, 2008).

Student Interest as a Moderator

Student interest in learning is a well-documented factor in determining academic success. Interest in a subject enhances students' motivation to engage with the material, leading to better learning outcomes (Schunk, Pintrich, & Meece, 2008). In the context of AI, student interest can amplify the effectiveness of AI tools. If students are interested in using AI-based learning tools, they are more likely to engage with the content and benefit from personalized learning experiences. Thus, student interest may moderate the relationship between AI adoption and teaching effectiveness.

METHODS

Participants

The study involved two groups of participants: 250 teachers and 400 students from various schools and universities that had integrated AI tools into their educational practices. The teachers included both experienced and novice users of AI technologies, ensuring a diverse sample in terms of familiarity and adoption levels. The student participants represented a wide range of academic disciplines and grade levels, with varying degrees of interest in technology and learning.

Data Collection

The data collection involved two main instruments:

1.   Teacher Survey: This survey assessed teachers' adoption of AI tools, the perceived ease of use of these tools, and their level of experience in using AI for teaching. Items were adapted from the Technology Acceptance Model (TAM) (Davis, 1989) to assess adoption and ease of use.

2.   Student Interest Survey: This survey measured students' interest in learning through AI-based tools, using a 5-point Likert scale to assess their engagement and motivation.

3.   Teaching Effectiveness Evaluation: Both teachers and students were asked to evaluate the effectiveness of teaching. Teacher self-assessments included questions about lesson delivery, student engagement, and learning outcomes. Students provided feedback on how AI impacted their learning experiences and engagement in class.

Data Analysis

Quantitative data were analyzed using Structural Equation Modeling (SEM) to assess the relationships between AI adoption, ease of use, teacher experience, student interest, and teaching effectiveness. Moderating effects were tested using interaction terms to explore how student interest influenced the relationship between AI adoption and teaching effectiveness.

RESULTS

AI Adoption and Teaching Effectiveness

The results indicated a strong positive relationship between AI adoption and teaching effectiveness ($\beta = 0.45$, $p < 0.01$). Teachers who actively adopted AI tools reported higher levels of teaching effectiveness, particularly in terms of student engagement and personalized learning.

Ease of Use and Teaching Effectiveness

Ease of use was also significantly related to teaching effectiveness ($\beta = 0.38$, $p < 0.05$). Teachers who perceived AI tools as easy to use were more likely to integrate them into their teaching practices, leading to improved learning outcomes. However, the ease of use was a stronger predictor for novice users compared to experienced users, who had developed strategies for overcoming technical challenges.

Teachers' Experience with AI

Teachers' experience with AI had a significant positive impact on teaching effectiveness ($\beta = 0.42$, $p < 0.01$). Experienced teachers were able to leverage AI tools in ways that enhanced their teaching strategies, resulting in better student engagement and improved learning outcomes.

Moderating Role of Student Interest

Student interest was found to significantly moderate the relationship between AI adoption and teaching effectiveness ($\beta = 0.34$, $p < 0.01$). The positive impact of AI adoption on teaching effectiveness was stronger among students with high levels of interest in learning through AI tools. In contrast, students with lower interest levels did not experience significant improvements in learning outcomes, despite the use of AI.

DISCUSSION

The findings highlight several important insights regarding the integration of AI in teaching. First, the adoption of AI tools, coupled with their ease of use and teachers' experience, significantly enhances teaching effectiveness. This suggests that AI can be a powerful tool in education when implemented appropriately and with proper support for teachers.

Second, the moderating role of student interest underscores the importance of aligning AI tools with students' learning preferences. AI tools are most effective when students are motivated and interested in the technology, suggesting that personalized learning experiences, which are a key feature of AI, can enhance student engagement and performance.

Teachers' experience with AI emerged as a critical factor. Experienced teachers are better able to navigate the complexities of AI tools and integrate them effectively into their teaching. For teachers who are less experienced, training and professional development in AI are essential to maximize the potential of these technologies.

CONCLUSION

This study demonstrates that AI adoption, ease of use, and teachers' experience all play crucial roles in enhancing teaching effectiveness. Moreover, student interest in learning through AI tools is a significant moderating factor, amplifying the positive effects of AI integration. Schools and educational institutions should prioritize teacher training on AI technologies and ensure that AI tools are aligned with students' interests to maximize their effectiveness in improving teaching and learning outcomes.

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