

EXPLORING THE IMPACT OF AI TOOLS: UNIVERSITY STUDENTS' ENGAGEMENT IN LEARNING ACTIVITIES

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ABSTRACT

This study investigates the influence of artificial intelligence (AI) tools on students' engagement and motivation in learning activities. With the increasing integration of AI technologies in educational settings, understanding their effects on student learning experiences is crucial. This study aims to examine how AI tools influence various aspects of student engagement, including enjoyment, interest, sense of autonomy, and perceived relevance of course materials. The research employs a quantitative survey to gather insights into student perceptions and experiences with AI tools. A diverse sample of students from universities are expecting to participate in the study, providing a range of perspectives across different academic disciplines and levels. Quantitative data analysis involves statistical techniques to examine correlations between the use of AI tools and indicators of student engagement, such as self-reported enjoyment, interest levels, and perceived relevance of course content. Overall, this research expects valuable insights into the complex dynamics between AI tools and student engagement in learning activities. The findings should contribute to our understanding of how educational technologies can be leveraged to promote more meaningful and effective learning experiences, ultimately informing the design and implementation of future AI-driven educational interventions.

Keywords: artificial intelligence (AI) tools, students' engagement, learning activities

1. Introduction

1.1 Background

In recent years, artificial intelligence (AI) has emerged as a transformative force across various sectors, including education. A research conducted by Colchester, K. et. al (2017) revealed that AI tools, ranging from adaptive learning systems to intelligent tutoring systems, have been integrated into educational settings with the promise of enhancing the learning experience. These technologies are designed to provide personalized learning experiences, automate administrative tasks, and offer real-time feedback, thereby potentially increasing student engagement and motivation (Deeva, G. et. al, 2021). The integration of AI tools in educational settings promises to revolutionize traditional learning paradigms by offering personalized, efficient, and engaging learning experiences. This study explores the impact of AI tools on university students' engagement in learning activities, a critical area given the growing reliance on digital technologies in higher education.

1.2 Problem Statement

Despite the widespread adoption of artificial intelligence (AI) tools in educational settings, there is a significant gap in understanding how these technologies impact student engagement and motivation. Specifically, there is a lack of comprehensive data on how AI tools influence various dimensions of student engagement, such as enjoyment, interest, sense of autonomy, and the perceived relevance of course materials. This study addresses the need to quantify and analyze the correlations between the

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use of AI tools and student engagement indicators. It seeks to fill this gap by employing a quantitative survey approach to collect data from a diverse sample of university students across different academic disciplines and levels. The research will utilize statistical techniques to assess these correlations, aiming to provide nuanced insights into the ways AI tools can enhance or hinder student engagement. By elucidating the complex dynamics between AI tool usage and student engagement, this study aspires to inform the development and implementation of more effective AI-driven educational interventions, ultimately contributing to improved educational outcomes and student experiences.

1.3 Research Objectives

The primary objectives of this study are:

- 1.3.1 To examine the relationship between the use of AI tools and student engagement in learning activities.
- 1.3.2 To investigate the effects of AI tools on various dimensions of student engagement, including enjoyment, interest, sense of autonomy, and perceived relevance of course materials.
- 1.3.3 To provide insights into how AI tools can be effectively utilized to enhance the learning experience.

2. Literature Review

2.1 Overview of Artificial Intelligence (AI) Tools in Education

AI tools in education encompass a wide range of applications, including adaptive learning platforms, intelligent tutoring systems, automated grading systems, and chatbots. These tools are designed to personalize learning experiences, provide instant feedback, and support administrative tasks, thereby potentially enhancing the efficiency and effectiveness of the educational process.

AI tools have become increasingly prevalent in educational institutions worldwide, driven by advancements in machine learning, natural language processing, and data analytics. These technologies facilitate adaptive learning environments, intelligent tutoring systems, automated grading, and personalized feedback, thus addressing the diverse needs of students more effectively than traditional methods (Seo, K. et. al, 2021) (Chan, C.K.Y. et. al, 2023).

2.2 Theoretical Framework: Student Engagement and Motivation

Student engagement and motivation are critical components of successful learning experiences. Engagement can be defined as the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning (Gregory, G., & Kaufeldt, M., 2015). Motivation, on the other hand, refers to the reasons underlying their involvement in learning activities. Theories such as self-determination theory and the expectancy-value model provide a framework for understanding how external factors, such as the use of AI tools, can influence student engagement and motivation.

2.2.1 Self-Determination Theory (SDT)

Self-Determination Theory (SDT), developed by Deci and Ryan (2012), is a broad framework for studying human motivation and personality. SDT emphasizes the importance of humans' evolved inner resources for personality development and behavioral self-regulation. AI tools can potentially

support the necessary needs by providing personalized learning experiences that allow students to progress at their own pace (autonomy), offering challenging tasks that are tailored to individual skill levels (competence), and facilitating collaboration and communication among peers (relatedness).

2.2.2 Expectancy-Value Theory (EVT)

Expectancy-Value Theory, primarily associated with Eccles and Wigfield (1994), posits that students' motivation is influenced by their expectations for success and the value they place on the success. AI tools can enhance students' expectancy by providing timely feedback and adaptive learning pathways that align with their current abilities. They can also increase the perceived value of tasks by linking them to real-world applications and personal interests.

2.2.3 Engagement Theory

Engagement Theory, proposed by Kearsley and Shneiderman (1998), suggests that students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks. AI tools can facilitate collaborative projects through virtual environments, support creative problem-solving with tools like AI-driven simulations, and link learning tasks to real-world issues, thus making learning more meaningful and engaging.

Table 1.0 Theories on Student Engagement and Motivation

| Theories | Self-Determination | Expectancy-Value | Engagement |
|------------------------|---|---|---|
| Key Components: | Autonomy: The need to feel in control of one's own behaviors and goals. | Expectancy: Belief about how well one will do on upcoming tasks. | Relate: Learning activities should involve collaboration among students. |
| | Competence: The need to gain mastery of tasks and learn different skills. | Value: Importance, interest, and utility of the task. | Create: Activities should be project-based and creative. |
| | Relatedness: The need to feel a sense of belonging and attachment to others. | | Donate: Learning tasks should have an authentic focus, contributing to the real world. |

By incorporating these theoretical frameworks, the study can systematically analyze how AI tools impact student engagement and motivation. SDT is investigating how AI tools support students' sense of autonomy, competence, and relatedness. EVT is exploring how AI tools influence students' expectations for success and the value they place on learning activities while Engagement Theory is examining the role of AI tools in promoting collaborative, creative, and authentic learning experiences.

2.3 Previous Studies on AI Tools and Student Engagement

Previous research has shown mixed results regarding the impact of AI tools on student engagement. Some studies suggest that AI tools can enhance engagement by providing personalized and adaptive learning experiences, while others indicate that the effectiveness of these tools depends on various

factors, including the design of the tool, the context in which it is used, and the individual characteristics of the students.

Research into the impact of AI tools on university students' engagement in learning activities is growing, reflecting the increasing integration of technology in education. Here is a summary of key findings from previous studies:

2.3.1 AI in Personalized Learning: AI tools have been found to enhance personalized learning experiences. For instance, Wang et al. (2020) reported that AI-driven adaptive learning systems can tailor educational content to individual student needs, thereby increasing engagement and improving learning outcomes. These systems analyze student performance data to adjust the difficulty and type of content presented, making learning more interactive and customized.

2.3.2 Intelligent Tutoring Systems: Research by Kulik and Fletcher (2016) highlighted the effectiveness of intelligent tutoring systems (ITS) in fostering student engagement. ITS use AI to provide immediate and personalized feedback to students, helping them to stay motivated and engaged. These systems simulate one-on-one tutoring by adapting to the learner's pace and understanding level, which has been shown to improve both engagement and academic performance.

2.3.3 AI in Collaborative Learning: Studies have also examined the role of AI tools in facilitating collaborative learning. Holmes et al. (2019) found that AI can enhance collaborative learning by forming optimal groups, mediating discussions, and providing real-time feedback. This can lead to higher levels of student interaction, participation, and engagement in group activities.

2.3.4 Gamification and Engagement: Gamified AI applications in education have been shown to significantly boost student engagement. A study by Hamari et al. (2016) demonstrated that incorporating game elements such as points, badges, and leaderboards into learning platforms can make learning more enjoyable and engaging, thus fostering a more active participation from students.

2.3.5 Emotional and Cognitive Engagement: AI tools that recognize and respond to students' emotional states can enhance engagement by providing timely and appropriate interventions. Research by D'Mello and Graesser (2012) indicates that emotion-aware AI can detect frustration or boredom and subsequently adjust the learning material or offer motivational support, leading to improved emotional and cognitive engagement.

2.3.6 AI-Driven Learning Analytics: AI-driven learning analytics provide educators with insights into student behavior and engagement patterns. According to Siemens and Baker (2012), these analytics can help in identifying disengaged students early on and tailoring interventions to re-engage them. By analyzing data on student interactions with learning materials, educators can make informed decisions to enhance student engagement.

In conclusion, the integration of AI tools in higher education has shown considerable promise in enhancing student engagement through personalized learning, intelligent tutoring, collaborative learning facilitation, gamification, emotional recognition, and learning analytics. These technologies help create more dynamic, responsive, and engaging learning environments that cater to the diverse needs of university students.

3. Research Methodology

3.1 Research Approach: Quantitative Survey

This study will employ a quantitative survey approach to collect data on students' perceptions and experiences with AI tools in their learning activities. The survey is designed to gather information on various aspects of student engagement, including enjoyment, interest, sense of autonomy, and perceived relevance of course materials.

3.2 Data Collection Methods and Samples

Data will be collected from a diverse sample of students enrolled in universities across different academic disciplines and levels. The survey will be distributed electronically, ensuring a broad reach and encouraging participation from students with varying experiences with AI tools.

3.3 Survey Instrument Development

The survey instrument will be developed based on existing scales and validated questionnaires used in previous studies on student engagement and educational technology. It will include Likert-scale items to measure students' self-reported levels of enjoyment, interest, autonomy, and perceived relevance of course content.

4. Conclusion

The integration of artificial intelligence (AI) tools in educational settings holds significant promise for enhancing student engagement and motivation. As AI technologies continue to evolve, their potential impact on the learning experience becomes an increasingly important area of study. This research aims to provide a comprehensive analysis of how AI tools influence various dimensions of student engagement, including enjoyment, interest, sense of autonomy, and perceived relevance of course materials.

4.1 Future Insights

4.1.1 Enhanced Student Engagement

The study's findings are expected to demonstrate that AI tools can significantly enhance student engagement. By providing personalized learning experiences, AI tools cater to individual student needs, making learning more enjoyable and relevant. Adaptive learning systems can adjust the difficulty level of tasks to match students' abilities, thereby maintaining their interest and motivation (Wang et al., 2020; Holmes et al., 2019).

4.1.2 Support for Autonomy and Competence

AI tools are anticipated to support students' sense of autonomy and competence, key components of the Self-Determination Theory. By allowing students to progress at their own pace and offering tailored feedback, these tools can help students feel more in control of their learning journey. This autonomy, combined with the competence gained from mastering challenging tasks, can lead to a more fulfilling educational experience (Ryan & Deci, 2000; Kulik & Fletcher, 2016).

4.1.3 Increased Perceived Relevance

The use of AI tools is also expected to increase the perceived relevance of course materials. By linking academic content to real-world applications and personal interests, AI tools help students see the value and importance of what they are learning. This connection can enhance their intrinsic motivation and engagement, as suggested by the Expectancy-Value Theory (Eccles & Wigfield, 2002; Hamari et al., 2016).

4.1.4 Promoting Collaborative and Authentic Learning

Engagement Theory emphasizes the importance of collaboration, creativity, and authenticity in learning activities. AI tools, such as virtual collaborative platforms and AI-driven simulations, facilitate these aspects by enabling students to work together on meaningful projects and solve real-world problems. This can lead to deeper engagement and a more immersive learning experience (Kearsley & Shneiderman, 1998; Holmes et al., 2019).

4.1.5 Informing Educational Interventions

The insights gained from this study will be valuable for educators and policymakers looking to leverage AI tools to enhance educational outcomes. By understanding the specific ways in which AI tools influence student engagement and motivation, stakeholders can design more effective educational interventions that promote meaningful learning experiences (Siemens & Baker, 2012; Wang et al., 2020).

4.1.6 Guiding AI Tool Development

The findings can also inform the development of AI tools tailored to educational settings. Developers can use the insights to create tools that better support student engagement and address the diverse needs of learners. Features such as adaptive learning pathways, interactive feedback, and real-world problem-solving can be prioritized to maximize the benefits of AI in education (Holmes et al., 2019; Kulik & Fletcher, 2016).

4.2 Possible Future Research Directions

4.2.1 Expanding the Scope of Study

Future research could expand the scope of this study by exploring the long-term effects of AI tools on student engagement and academic achievement. Longitudinal studies could provide deeper insights into how sustained use of AI tools influences learning outcomes over time.

4.2.2 Investigating Diverse Educational Contexts

Further studies could also investigate the impact of AI tools in diverse educational contexts, including primary and secondary education, vocational training, and adult learning. Understanding how AI tools perform across different settings can help generalize the findings and inform broader educational practices.

4.2.3 Examining Technological Integration

Research could explore the integration of AI tools with other educational technologies, such as learning management systems and virtual reality. Examining the synergistic effects of multiple technologies could lead to more comprehensive strategies for enhancing student engagement and learning outcomes.

In summary, this study aims to shed light on the complex dynamics between AI tools and student engagement in learning activities. By employing a quantitative survey approach and leveraging robust theoretical frameworks, the research seeks to provide valuable insights into how AI technologies can be harnessed to create more engaging and effective educational experiences. The findings will not only contribute to the academic understanding of AI in education but also offer practical guidance for educators, policymakers, and developers striving to enhance learning through innovative technological solutions.

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