The Effects of AI-Powered Adaptive Learning on Academic Achievement and Student Engagement among Students with Learning Disabilities

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Abstract:

This study examines the effects of an AI-powered adaptive learning system on academic achievement and student engagement among students with learning disabilities. A quasi-experimental one-group pre-test and post-test design was employed with a sample of 60 students from special education settings. Participants received an AI-based adaptive learning intervention over a four-week period. Data were analyzed using paired-sample t-tests and multiple regression analysis. The findings indicate that students demonstrated significantly higher academic achievement after the intervention ($t = 9.21$, $p < 0.001$). Additionally, student engagement levels were significantly improved ($t = 7.84$, $p < 0.001$). Regression analysis revealed that adaptive learning significantly predicted academic achievement ($\beta = 0.58$, $p < 0.001$). Furthermore, engagement was found to partially mediate the relationship between AI usage and academic performance ($\beta = 0.34$, $p < 0.01$). However, no significant differences were observed in cognitive load ($t = 1.32$, $p > 0.05$). The study concludes that AI-powered adaptive learning systems can enhance academic outcomes and engagement among students with learning disabilities. These findings support the integration of AI technologies in special education while highlighting the need for further research on cognitive factors.

Keywords:

Artificial Intelligence, Adaptive Learning, Learning Disabilities, Academic Achievement, Student Engagement.