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Driving Educational Outcomes via AI: The Intersection of Pedagogy, Guidelines, and Student Engagement in Malaysian Universities

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Abstract

The rapid adoption of artificial intelligence (AI) tools in higher education has transformed teaching, learning, and assessment practices. This study examines the impact of pedagogical implications, institutional guidelines for generative AI use, and student engagement with generative AI on academic outcomes in Malaysian higher education institutions. A quantitative, cross-sectional, and correlational research design was employed, involving 445 students from public and private universities. Data were analyzed using SPSS through descriptive statistics, correlation, and multiple regression analysis. The findings reveal that student engagement with generative AI is the strongest predictor of academic outcomes ($\beta = .749$, $p < .001$), indicating that active and meaningful interaction with AI tools significantly enhances academic performance. Institutional guidelines for generative AI use also demonstrate a positive and significant effect ($\beta = .106$, $p < .001$), suggesting that clear policies and ethical frameworks support effective AI integration in learning. However, pedagogical implications show no significant direct effect on academic outcomes ($\beta = .026$, $p = .501$). Overall, the model explains 66.8% of the variance in academic outcomes ($R^2 = .668$), indicating strong explanatory power. The study highlights the importance of student-centered engagement and structured institutional governance in maximizing the benefits of AI in education. These findings provide valuable insights for educators, policymakers, and higher education institutions in designing effective AI-enhanced learning environments.

Keywords: Artificial Intelligence; Generative AI; Student Engagement; Academic Outcomes; Pedagogical Implications; Higher Education.