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Strengthening First-Year Physical Sciences Success: A Five-Year Analysis of Throughput with an Emphasis on AI-Driven Strategies

In recent years, declining student success rates, particularly in first-year programs, have become a critical concern in higher education. This study examines throughput rates in first-year physics and chemistry courses over a five-year period, drawing on data from an extended curriculum program to identify and address key challenges. At the core of this study is the integration of Artificial Intelligence (AI) to enhance teaching and learning processes. Grounded in the Technological Pedagogical Content Knowledge (TPACK) framework, the study explores how AI can be embedded into the physical sciences curriculum to support student engagement and content mastery without disrupting existing pedagogical methods. By leveraging AI, the study aims to bridge the gap between theoretical knowledge and practical application, thereby improving throughput rates. Findings indicate that AI-driven strategies have significant potential to enhance student success in first-year physical sciences programs. AI-powered tools can facilitate personalized and adaptive learning experiences, leading to improved student engagement and retention. However, continuous assessment and refinement of these strategies are essential to ensure their effectiveness in meeting the evolving needs of students. By fostering AI-enhanced learning environments, institutions can reduce dropout rates, alleviate the demand on student support services, and implement more targeted interventions for at-risk students.

Apply for student award at which level:

None

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Yes, I ACCEPT

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