

Unveiling Cognitive Engagement in Online Geography Learning: A Learning Analytics Approach Using Time-on-Task, Response Accuracy, and Depth of Understanding

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Abstract

This study examines cognitive engagement in online geography learning using a learning analytics approach that integrates time-on-task, response accuracy, and depth of understanding. The participants were 50 undergraduate students enrolled in an environmental geography course, with data collected from Learning Management System (LMS) activity logs and assessment results. A quantitative design was applied using descriptive statistics, and regression. The findings show that average response accuracy reached 60.02%, with an average time-on-task of 17.44 minutes and a depth of understanding score of 57.86%. The results indicate that time-on-task does not exhibit a consistent linear relationship with response accuracy. Instead, depth of understanding emerges as the strongest predictor of student performance, suggesting that cognitive processing quality is more influential than time spent on tasks. These findings highlight that cognitive engagement in LMS-based learning is better reflected through depth of understanding rather than behavioral indicators alone. The study contributes to learning analytics by emphasizing the importance of integrating cognitive dimensions into evaluating online learning effectiveness. However, variations in student performance indicate diverse learning behavior patterns, warranting further investigation.

Keywords

Cognitive Engagement, Online Learning, Time-on-Task, Response Accuracy, Depth of Understanding, Geography.