

Mandatory vs. Optional: How Course Integration Drives Student Engagement with Virtual Laboratory Simulations

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Abstract

Virtual lab simulations can enhance both intrinsic and extrinsic motivation by making learning more engaging and relevant. As part of the Microbiology course in the Bachelor of Biomedicine study program, students were given access to two pre-lab simulations and four optional post-instruction simulations to identify factors influencing completion rates. While the pre-lab simulations had high completion rates, the optional post-lecture simulations, linked to workforce relevance, were not prioritized. Only 17% of the 144 students who completed the first pre-lab simulation also completed the first optional simulation, and just 4% completed the last optional simulation. Despite low completion rates for optional simulations, feedback indicates a positive attitude towards simulations: 88% of the respondents completely or partially agreed that pre-lab simulations improved learning, with 89% agreeing that simulations provided higher learning outcomes compared to traditional lectures, and 83% would recommend the simulations to other students. To boost completion rates, students suggested setting specific times for completion (38%), introducing mandatory requirements (52%) and offering shorter simulations (28%). Our findings suggest that integrating simulations into laboratory exercises or plenary sessions, or making them mandatory, could enhance student engagement and completion. Shorter simulations, joint walkthroughs and peer interaction are additional strategies to improve completion rates.

Keywords: Biomedicine; Gamification; Labster; Learning outcome; Student-centered