

A Study on Alternative Learning for Materials Engineering Students

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Abstract

Engineering students face difficulties in accessing the resources required to succeed in their coursework. This study explores the impact of expanded resources on students from diverse engineering backgrounds taking the mandatory MATE 215 Introduction to Materials Engineering Laboratory course. It examines the effects of online tools and in-person guidance on student learning and engagement. A survey was designed and disseminated to assess the effectiveness of additional resources in improving student understanding. The survey was developed based on the author's engineering management knowledge and research on universal design in digital learning environments. It employed a mixed-methods approach to investigate the effects of centralized resources on student learning. The survey included both quantitative and qualitative questions to gauge student experience. The instructor also collected observational data on the student's behavior and engagement during lab sessions. Preliminary findings suggest that providing supplementary resources creates a stress-free and inclusive environment that promotes student engagement and learning. The data also indicates that students from various engineering backgrounds benefit from having access to additional resources, as it enables them to approach the material from different perspectives and encourages collaboration and teamwork. The study's results have important implications for engineering education by highlighting how diversified resources enhance student learning. The findings can aid in developing new strategies and inventions to support student success, particularly for those from underrepresented backgrounds. Overall, the study's methodology and results can serve as a model for future research aimed at improving the quality of engineering education.

Keywords

Engineering Education, Student Learning, Digital Learning, and Universal Design.

Biographies

Erika Szaldobagyi is a California Polytechnic State University San Luis Obispo Materials Engineering Graduate and Instructor for the Materials Engineering (MATE) Department. She is currently in the Engineering Management Master Program in Industrial & Manufacturing Engineering (IME) Department. She is a member of the Society of Women in Engineering (SWE) and other programs on campus that deal with developing leadership skills. She has done undergrad research in community college using an x-ray diffraction machine (XRD) and again at Cal Poly on creating polymers and analyzing the samples through several machines in the MATE department. She is currently involved in many aspects of campus life from a student to faculty perspective.

Mohamed Awwad is an Assistant Professor in the Department of Industrial and Manufacturing Engineering at California Polytechnic State University (Cal Poly), San Luis Obispo, CA. He received his Ph.D. and M.S. degrees in Industrial Engineering from the University of Central Florida, Orlando, FL, USA. Additionally, he holds M.S. and B.S. degrees in Mechanical Engineering from Cairo University, Egypt. Before joining Cal Poly, San Luis Obispo, Dr. Awwad held several teaching and research positions at the State University of New York at Buffalo (SUNY Buffalo), the University of Missouri, Florida Polytechnic University, and the University of Central Florida. His research and teaching interests include applied operations research, logistics & supply chain, blockchain technology, distribution center design, unconventional logistics systems design, and OR applications in healthcare and the military.