

Addressing Cognitive Load Challenges in STEM Education: Implementing Intrinsic Motivation Micro-Interventions

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Abstract. This study explores the impact of intrinsic motivation micro-interventions in reducing cognitive load in STEM classrooms. Utilizing a mixed-methods approach, the research evaluates the efficacy of tailored instructional strategies to enhance student engagement and comprehension. Findings suggest significant improvements in learning outcomes, highlighting the potential for scalable applications in diverse educational settings.

Keywords: Cognitive Load, Intrinsic Motivation, STEM Education, Micro-Interventions, Student Engagement

Introduction

The global education sector faces a persistent challenge in effectively engaging students in STEM (Science, Technology, Engineering, and Mathematics) disciplines, where cognitive overload is a prevalent barrier to achieving optimal learning outcomes. The issue of cognitive load, defined by Sweller's Cognitive Load Theory, pertains to the amount of mental effort required for learning and problem-solving. Excessive cognitive load can impede the learning process, particularly in the complex problem-solving tasks characteristic of STEM education. Recent advancements in educational psychology propose intrinsic motivation as a crucial lever for enhancing learning efficacy, positing that when

students find personal relevance and interest in the material, they can better manage cognitive demands. This paper investigates the integration of intrinsic motivation micro-interventions as a method to mitigate cognitive overload in STEM education. Through a rigorous mixed-methods research design, this study examines the implementation of these interventions across diverse educational settings, measuring their impact on student engagement and learning outcomes. The results provide compelling evidence for the adoption of these strategies at a broader scale. The paper is structured as follows: a review of the relevant literature on cognitive load and motivational strategies, a detailed methodology section outlining the research design and interventions, an analysis of findings with a discussion of implications for practice, and a conclusion with recommendations for future research.

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