

MATHEMATICS ANXIETY AND VIRTUAL REALITY: EXPLORING COGNITIVE LOAD IN SIMULATED ALGEBRA LESSONS

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Abstract

This study aims to explore the relationship between math anxiety, the use of virtual reality (VR) technology, and cognitive load in simulation-based algebra learning. Math anxiety is a significant barrier to learning, impacting students' motivation, conceptual understanding, and academic performance. On the other hand, developments in educational technology, particularly VR, offer more immersive, interactive, and contextual learning experiences, potentially reducing math anxiety and increasing learning engagement. However, the adoption of VR also presents new challenges related to cognitive load, as the complexity of visual displays, navigation, and interactions in simulated environments can burden students' mental processes. Using a literature review method, this study examines the results of previous studies on the relationship between math anxiety, the effectiveness of VR in algebra learning, and the implications of cognitive load in technology-based learning experiences. The results indicate that VR has the potential to positively impact reducing math anxiety by increasing emotional engagement and learning motivation. However, its successful implementation is strongly influenced by instructional design that balances visual stimuli with students' cognitive capacities. This study recommends the need for VR-based learning design strategies that are adaptive to students' anxiety levels and cognitive load management to optimize algebra learning outcomes in virtual environments.

Keywords: mathematics anxiety, virtual reality, cognitive load, algebra learning

INTRODUCTION

Math anxiety is a psychological phenomenon that has consistently attracted attention in education, particularly in challenging subjects such as algebra ("Exploring Virtual Reality's Impact on Math Anxiety," 2025a). Numerous previous studies have shown that math anxiety impacts not only students' academic performance but also how they process information, make decisions, and build confidence in learning. This situation is even more concerning given that mathematics is a key pillar in developing logical, analytical, and problem-solving skills, which are essential for various scientific fields and everyday life. Math anxiety manifests itself in feelings of stress, fear