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#### **Authors**

Aguilar, Samantha D.  
Crabb, Katherine  
Stautler, James  
et al.

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# AR Classroom usability studies: Implications for enhancing educational technology

**Samantha D. Aguilar**

Texas A&M University, College Station, Texas, United States

**Katherine Crabb**

Texas A&M University, College Station, Texas, United States

**James Stautler**

Texas A&M University, College Station, Texas, United States

**Heather Burte**

Texas A&M University, College Station, Texas, United States

## Abstract

Augmented reality (AR) can enhance students' learning within problem-solving and abstract thinking domains and enhance traditional pedagogy focused on mathematical technical and theoretical knowledge (Wang et al., 2018). Two usability studies examined user interactions and learning of three-dimensional (3D) matrix algebra after using one of two versions (virtual versus physical) of the AR Classroom. The AR Classroom facilitates the learning of geometric transformations and their mathematics through virtual interactions (using sliders to view rotations overlaid onto a LEGO model) or physical interactions (physically rotating a LEGO model) to help in cognitive offloading and spatial thinking related to 3D transformations and matrix algebra through embodied learning. Quantitative and qualitative analyses of the first usability test revealed modifications that could improve usability, and analyses of the second usability test revealed the impact of those modifications. Implications of findings for a variety of other educational technologies will be discussed.