# Panoramic Visualization vs. Merely 'Large' Screens: Comparing Memory & Recall Between Immersive and Conventional Virtual Environments

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## Overview

Digital visualization tools have been employed by environmental designers for a generation and are now technology robust. Such technologies enable three-dimensional creation and evaluation of existing and proposed environments virtually. Immersive visualization environments, often taking the form of multi-screen systems that immerse a viewer or audience, are becoming widespread in research settings. Increasingly, immersive visualization environments are being used for the creation, presentation and evaluation of virtual environments, sometimes all occurring simultaneously in a workshop setting (Danahy, 2005). The effectiveness of visualizations for spatial communication has been reported, particularly when communicating spatial information to those untrained in the design disciplines (Kwartler, 2005). As scenario techniques and 3D visualization are increasingly used for strategic planning and design it is essential that empirical research support the efficacy and value that digital methods and techniques contribute to the design process. To date there has been limited empirical research conducted on this topic.

## Methods

The study reported in this paper was designed to assess the contribution to memory and recall of immersive visualization compared to conventional one-screen projection systems, within the context of spatial design. Two types of memory were focused on: abstract (declarative) memory, which stores facts and events and requires conscious recall, and concrete (procedural) memory, the long-term memory of skills and procedures learned through repetition. The hypothesis was that immersive visualization would benefit declarative memory while having little impact on procedural memory.

In the between-group experiment participants were shown still images and 3D digital models in either an immersive visualization laboratory (equipped with three projection screens offering 180 degree viewing) or, a conventional one-projection screen lecture space. Two sample groups were comprised of 18 university students per group. Following the experiment participants answered a questionnaire focusing on shape, colour, and object orientation, which tested for declarative and procedural memory within the framework of gestalt (unified whole) and object-oriented designs (relationships between objects).

## Results

The results indicate a complex relationship between immersive and conventional visualization, each offering memory advantages depending on the type of information presented. The impacts of the findings are discussed as well as directions for future research.

## References

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