

# Investigating the benefits of virtual reality on student acquisition of 3D anatomical information

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# Investigating the benefits of virtual reality on student acquisition of 3D anatomical information

Benjamin Karger, Juliana Pinheiro, and Kevin Flaherty

## Introduction

Virtual reality (VR) technology is becoming more accessible within educational settings due to price decreases and greater software availability. VR is particularly useful for teaching anatomy, as students often struggle to learn the three-dimensional relationships between body structures from two-dimensional images in textbooks. However, there is insufficient research into how effective VR is for teaching anatomy to undergraduates. Using funds from Augustana's Pedagogy and Technology Grant, we purchased and assembled a VR workstation and began researching the effectiveness of VR in anatomy education.

## Methods

Volunteers from the BIOL 351: Human Anatomy class participated in two 30 minute trials, one using VR and one using a desktop anatomy program. Students were given pre- and post-tests to gauge the improvement in their anatomical knowledge during each trial. Both the VR and desktop anatomy software were made by 3D Organon™. Students were also given a survey to determine their level of comfort and satisfaction with each program. This research was performed in accordance with IRB protocol 468266257.

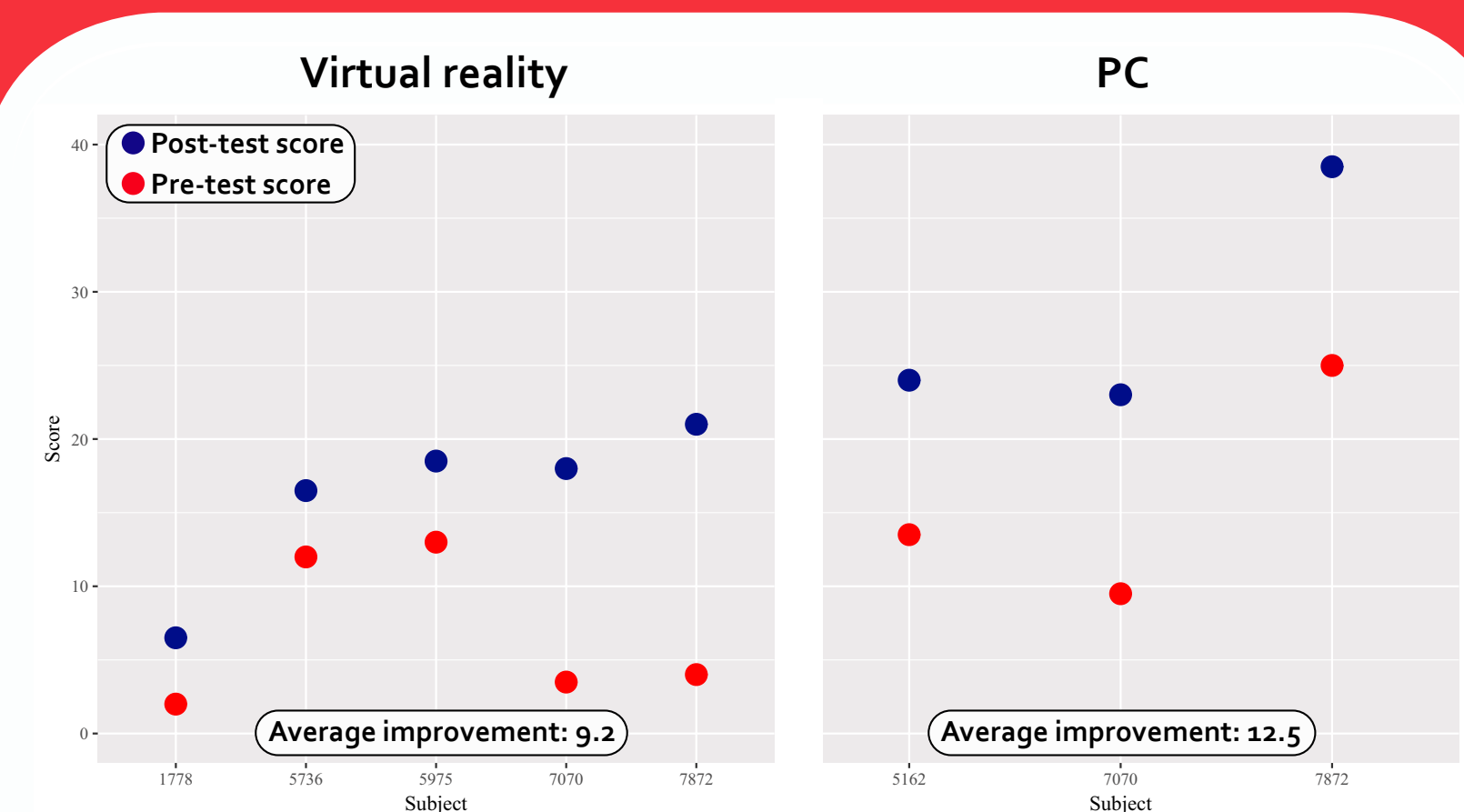


Fig 1) Graphs of pre-test (red) and post-test (blue) scores for students studying anatomy with VR (left) and PC (right). The average improvement in pre-test vs post-test scores is similar for VR (9.2) and PC (12.5), though the sample size is insufficient to draw conclusions about the effectiveness of either method.

## Results

Presently, the sample of students collected for this study is insufficient to draw strong conclusions about our hypothesis. Our pilot data indicates that students greatly improve their anatomical knowledge and 3D visualization of structures after a 30 minute session using VR. However, students showed similar improvement after using the desktop anatomy software for 30 minutes, indicating that VR is not uniquely suited for teaching anatomy relative to other digital methods (Fig 1).

When surveyed about their perceptions of VR for learning anatomy, students were uniformly positive about the VR experience, and preferred it to using the desktop program. Students indicated a high level of comfort using VR, despite the fact that the vast majority of them had never used a VR headset previously.

**Students improved substantially in content knowledge and 3D visualization of anatomical structures after using virtual reality to study, though desktop 3D anatomy software yielded similar results**

## Virtual reality in action



Fig 2) Picture of Augustana student Ben Karger using the VR system (left) and QR code to video of Ben using the VR headset to navigate virtual reality anatomy software (right). Scan the code with a QR reader on your phone to view the video.

## VR educational videos Scan QR codes to watch VR videos

### Introduction to the skull



### The heart



Atrial fibrillation



Coronary heart disease

### Thigh muscles



### Lung anatomy



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