Technology Based Teaching Method

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Introduction

There has been an increasing use of Augmentation and virtual reality. We usually see virtual reality used in video games but there are other uses for this technology. The educational approach to augmentation and virtual reality has been quite popular especially within medical institutions. The earliest original technology of augmentation and virtual reality dates back to Charles Wheatstone in 1838 in which he created the stereoscope. The stereoscope used optical trickery to make two dimensional images look three dimensional by viewing two similar images with different perspectives in each binocular. Augmentation and virtual reality have grown into what we know it today through devices that you wear on your head or face. Augmentation and virtual reality have the potential to significantly enhance the learning experience. We will explore strengths, weaknesses, and benefits of augmentation and virtual reality in education through recent research by analyzing its evidence available to guide implementation of the technology.

Purpose/Evidence for Educational Best Practice

Head-Mounted Devices (HMD) has been the leading predecessor the Charles Wheatstone's Stereoscope. A strength that Barteit et al., (2021) article about these Augmentation and Virtual reality HMD is that it could save money to educational institutions. "The advantages are that HMDs enable repeated practice without adverse effects on the patient in various medical disciplines; may introduce new ways to learn complex medical content; and may alleviate financial, ethical, and supervisory constraints on the use of traditional medical learning materials, like cadavers and other skills lab equipment" (Barteit, etal., 2021, p. 1). They examined the effectiveness of HMDs for medical education in global health perspective by comprising low- and middle-income countries. They concluded that not only that HMDs were beneficial to

medical education, but it was also engaging and enjoyable to the learners. It also showed that HMDs could provide a high-quality element for medical education in low-income countries. In summary, the use of augmentation and virtual reality HMDs in medical education is benefited financially.

Another way how augmentation and virtual reality can be used is the use of smartphones. Low-cost consumer companies such as Google and Samsung have created augmented reality (AR) and virtual reality (VR) more accessible than before. Huang et al., (2019) exploratory study has shown the impact of AR & VR education through learning outcomes such as science retention. Although this study has various limitations such as their study utilizing a sample of female and college-aged participants, results still concluded to be beneficial. “Cost-effective and portable AR and VR technologies provided by smartphone-based mobile applications provide tremendous potential for education” (Huang et al., 2019, p 110).

Pelargos et al., (2017) talks about the uses of AR and VR technology in neuroscience. Although it has its benefits by introducing new modalities being integrated into neurosurgical practice and resident education, it also has its barriers as well. AR and VR as not yet to achieve commercial success in which it has hindered in the adaptation of neurosurgery. These dependent variables include vision, usability, flexibility, wearability, and affordability. “In order to provide an immersive experience that would allow for improved surgical planning and resident training, a VR system must reach a certain threshold of depth of field, depth of focus, field of view, image resolution, and position tracking” (Pelargos et al., 2017, p. 2). Although AR and VR has already been integrated in preoperative and intraoperative assessments, it has yet to be efficient and effective as a real-time navigation in the operating room.

Another use of augmentation and virtual reality has been found beneficial in radiotherapy training. The use of Virtual Environment for Radiotherapy Training (VERT) has been increasing in which it has uses for strengthening the students' knowledge and skills in online-image acquisition and review of planar two-dimensional images and cone beam computed tomography images. VERT tutorials have reinforced elements in the educational process such as communication, efficacy, accuracy, decision-making, and feedback specifically in teaching image-guided radiation therapy (IGRT). "The use of VERT can facilitate the development of more engaging and interactive teaching through the simulation of clinical workflows and hands-on image" (Chamunyonga et al., 2020, p. 212). The use of VERT has overall benefited in strengthening skill acquisition in radiation therapy.

The use of virtual three-dimensional models has been an ongoing teaching method in medical institutions. More specifically, the use of three-dimensional virtual anatomy has only been an enhancement to traditional learning. In the article of Lo et al., (2020) introduces a 3D anterolateral (ALT) model in which they describe the development and utilization of a virtual 3D flap model being used in the undergraduate curriculum. A course evaluation of the use of the virtual ALT model was preferred among the learners compared to other learning methods such as textbooks and lectures. Although it is a preferred learning method, the research created a point in which it has limitations to retention of learning. "However, despite the appetite for virtual and augmented reality models, empirical evidence supporting current technologies is limited, and studies suggesting that further development and educational validation are required" (Lo et al., 2020 p. 6). With the advancement of augmentation and virtual reality has gotten and the potential it has for the future of medical education, it is still not enough to fully replace traditional learning.

Supporting Educational Principles & Theories

Augmentation and virtual reality seem to be supported heavily in presenting anatomical sites of a human body, but it seems to have much more potential in other areas in medical education. A specific class that would benefit from virtual reality is pathophysiology. An augmented reality or virtual reality would enhance student learning by visualizing certain disease processes in the human body. Pathophysiology can be a difficult class to understand by just textbook and lectures. Sometimes professors may have to explain disease processes through pictures or videos. Augmentation or rather virtual reality will help bring those pictures or videos a step further and will help enhance learning pathophysiology. It would be simulating diseases in real-time or even present the disease down to the molecular level. It gives the learners a more interactive and immersive learning experience.

This technology-based teaching method would support the Cognitive Load Theory in which this may help reduce cognitive overload through creating schemas. Augmentation and virtual reality may help with intrinsic load and Germane load; it can make the learning process more efficient and less cognitively demanding.

To evaluate the effectiveness of this technology-based teaching method would be dependent on the student's learning outcomes and feedback from the learners. It is essential to assess empirical data and feedback to ensure that students are meeting their educational goals.

Conclusion

It is recommended that the use of augmentation and virtual reality used in nursing education would have to emphasize the explanation of a disease process if it is being used in pathophysiology. Rather than having augmentation and virtual reality teach the class, it is a tool that should be used in congruence with traditional teaching with lectures and textbooks. As it

was mentioned earlier, it is not a replacement but a supplement to the many other teaching methods that nursing professors are already using today. Future nursing education research would definitely include effectiveness of this technology-based teaching. Another implication for the future nursing education research would be the use of this technology-based teaching method by itself in comparison to traditional education. More research should be targeted towards the use of augmentation and virtual reality specifically in nursing education rather than generalizing medical education.

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