Using Virtual Reality to Help Students Manage Exam Anxiety

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Project Description
Background
Context: Stress and anxiety are commonplace on university campuses and often increase during exam periods. In professional Health Sciences programs such as Rehabilitation Medicine (Occupational Therapy, Physical Therapy, and Communication Sciences Disorders), stress and anxiety increase significantly during clinical examinations. In particular, Objective Structured Clinical Examinations (OSCEs) are commonly used in professional Health Sciences programs to evaluate the integration and application of knowledge by having students demonstrate practical "hands-on" skills (Zayyan, 2011). Student stress and anxiety need to be addressed to promote student health and well-being. As a University, we are mandated to promote safe spaces for learning on campus, and there are documented negative effects associated with stress/anxiety and test performance.

Stress and anxiety on campuses such as the University of Alberta (UofA) is a critical problem. There is increasing evidence that mental health plays a significant role in students' citizenship, discovery and learning (University of Alberta, 2015). According to National College Health Assessment (NCHA) data of UofA students in the spring of 2013, 86.9% of students felt overwhelmed by all their tasks to complete, 8.5% seriously considered suicide, 50.2% felt things were hopeless, and 54.7% felt overwhelming anxiety (University of Alberta, 2015). When extrapolating this data, 54.7% of the campus population results in 21,607 students at the UofA having overwhelming anxiety (University of Alberta, 2015). This trend is not exclusive to Canada, Revicki et al. (2012) note that the prevalence of generalized anxiety disorder is comparable learning to the US, Europe, and Australia.

Anxiety & Testing: Anxiety often results from the anticipation of an event perceived as stressful. Clinical exams known as OSCEs, are often a novel experience for students just starting in Health Sciences programs. Students are stressed with clinical examinations because most are not used to having to do performance based assessments in a high-stakes environment. One way to address student anxiety levels could be to modify their perceptions of the testing event by engaging them more often in similar "low-stakes" learning experiences. These experiences aim to reduce unfamiliarity with this exam format and anxiety/stress. We can do this in an innovative way using Virtual Reality (VR), which is defined as "an artificial environment which is experienced through sensory stimuli (as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment" (Merriam Webster, 2017). Virtual Reality has been used as a promising intervention for generalized anxiety and related disorders (Parsons & Rizzo, 2008). However, VR has also been used in the context of high-fidelity simulation learning in education (Alaker et al. 2016). Our project will focus on the latter application of VR.

Sommer & Arendasy (2015) discuss a deficit model in relation to test anxiety, claiming that test anxiety is mainly due to lack of student preparedness for high-stakes exams. A VR experience simulating aspects of the OSCE test would provide the opportunity for additional preparation as

well as familiarize the student with the test environment.

Purpose

The purpose of this project is twofold:

1) To develop a VR experience simulating aspects of the clinical exam assessments (OSCEs)

2) To assess the effect of using VR on student stress, specifically anxiety associated with performance on clinical exam assessments (OSCEs).

Educational Theory

Use of VR as an immersive simulated experience is a key feature of this project. The principles underlying the development and evaluation of the VR experience is experiential learning, which is aligned with the constructivist theory of learning. Simulation education is grounded in the pedagogy of mastery learning (Guskey, 2010; Alaker, Wynn & Arulampalam, 2016). The theory underlying the use of VR to evaluate the effect on student anxiety is cognitive behavioral, specifically systematic exposure therapy (Powers & Emmelkamp, 2008). This theory posits that repeated exposure to an anxiety inducing stimulus provides opportunities for the participant to process the experience cognitively and emotionally with the goal of reducing anxiety to the stimulus over time.

An early study by Rothbaum (2000) uses Virtual Reality Exposure Therapy for the treatment of the fear of flying. Harris, Kemmerling & North (2002) looked into the effectiveness of using Virtual Reality Therapy in reducing public speaking anxiety of university students. North, North & Crunk (2004) published a case study using Virtual Reality Therapy for the successful treatment of test anxiety. Klinger et al. (2005) compared the effectiveness of Virtual Reality Therapy to Cognitive Behaviour Therapy in the treatment of social phobia showing both interventions to be equally effective over a 12-week period.

Methods

Phase 1: A VR experience aimed at preparing students for generic OSCE skills focusing on, communication, collaboration, decision making, patient management skills and clinical reasoning (Zayyan, 2011) will be developed. This VR experience will be beta-tested by the research team and collaborators until it is determined to be ready for implementation. This component will be evaluated qualitatively through the use of focus groups targeting instructors and students to provide feedback on content and quality of the simulation. Any impacts on student strategies for preparing for clinical exams will also be explored.

Phase 2: Once the VR experience has been finalized, Rehabilitation Medicine students will be invited to participate in this study and compared to a non-intervention group. In keeping with self-directed learning strategies, recruited participants will be given the opportunity to use the VR simulations as preferred in preparation for their OSCEs. Of note, Lotz & Sparfeldt (2017) identify that test anxiety often peaks in the final weeks before final exams.

Phase 3: Participants will complete three surveys identifying their performance concerns and rating their perceived level of anxiety; 1) a pre-survey when they first learn about the OSCE requirements (but before engaging with VR), 2) a pre-OSCE survey and, 3) a post-OSCE survey. The Test-Anxiety Inventory will be used (Spielberger, 2010; Sommer & Arendasv, 2015; Lotz & Sparfeldt, 2017). Qualitative data will be analyzed using a descriptive qualitative approach

resulting in key themes summarizing the student experience. The quantitative results will be used in conjunction with the qualitative findings to enhance our understanding of the effects of VR on students' well-being and anxiety related to OSCEs. These survey results will be compared to a non-intervention group of students asked to anonymously complete the same survey at the same time intervals. Survey data will undergo quantitative analysis for descriptive statistics, correlations, and/or chi-square results. Students will also participate in semi-structured interviews as well as a focus groups to gain a better understanding of their experience with use of VR to help their anxiety.

Evaluation
Evaluation of project outcomes will use a Mixed Methods Exploratory design and are outlined above within Methods section.

Innovation
In a 2013 report by the University of Alberta's Online Visioning Committee, multiple modalities of learning were recommended to enhance the quality of programs and the student experience: "Through the creation of novel digital learning experiences inside and outside of the classroom, [The University of Alberta] can appeal to traditional and non-traditional learners." (p. 1). In the spirit of this recommendation, this project will explore the effectiveness of VR technology to enhance the educational experience of students through additional practice opportunities and stress reduction before assessment activities.

This project is innovative because it integrates and applies cutting-edge technology within education to provide safe learning opportunities and promote student health and well-being. Although VR is mainstream in the gaming world, it is still a new concept for many within education and the Health Sciences.

Collaboration
The core project team has an established track record of successfully completing various initiatives. The team has been intentionally constructed with specific expertise in mind; individuals who are knowledgeable and experienced in the development of VR learning objects, educational measurement, clinical evaluation, curriculum development and experience with student accommodations stress and anxiety.

This initiative will continue to build collaborative partnerships between Faculties. Although the environment will be tested with Rehabilitation Medicine students, the potential application will extend to any Health Sciences program such as Medicine and Nursing.

Collaboration for this project will include the following partners;
- Faculty of Rehabilitation Medicine
  - Department of Occupational Therapy (Shaniff Esmail, Mary Roberts, Susan Mulholland)
  - Department of Physical Therapy (Mark Hall)
  - Department of Communication Sciences Disorders (Luanne McFarlane)
- Department of Computing Science (Eleni Stroulia)
- Cognitive Projection (Martin Ferguson-Pell)

Sustainability & Impact:
The scope of this project has potential impact on Health Sciences by providing a new tool for students as exam anxiety is an ongoing concern that will continue to need to be addressed. If the VR experience is found to be successful, it will be made available to all Health Sciences Students. Virtual reality equipment is becoming a norm in the gaming world and is now being used within the Faculty of Rehabilitation Medicine (Edmonton and Calgary Cohorts) to enhance teaching and learning. The ultimate goal is to develop a practical cost effective mechanism students can independently utilize to prepare for clinical exams. The program maybe eventually converted into an app which students could download and independently use with inexpensive equipment such as Google cardboard and a smartphone or their home gaming system.

Dissemination
The results of this project will contribute to the scholarship of teaching and learning and disseminated primarily via publication and presentations locally, nationally, and/or internationally and within the areas of the Health Sciences, as well as more broadly within higher education. Locally, the University of Alberta hosts the Dr. Olive Yonge Teaching and Learning Scholarship Day through the Faculty of Nursing. Additionally, the University of Calgary hosts a Conference on Postsecondary Learning and Teaching through the Taylor Institute as well as a Simulation Education and Research Symposium through the Faculty of Medicine. Nationally and internationally there are a number of conferences that focus on education, both healthcare education specific and general education. Some high impact conferences that will be considered in the field of healthcare education include; the Canadian Conference on Medical Education (CCME), Healthcare Education Association (HCEA), the International Nursing Association for Clinical Simulation (INACS) and/or the Association of Medical Education in Europe (AMEE). Other education conferences that will be targeted include: American Educational Research Association (AREA) and/or the International Society for Technology in Education.

A manuscript will be prepared and submitted to journals focused on the scholarship of teaching and learning that are both discipline specific and transdisciplinary journals, such as; Medical Education, Academic Medicine, Teaching & Learning in Medicine, Advances in Health Sciences Education, Journal of Health Education Teaching, Society for Simulation in Healthcare, and/or the International Journal of Medical Education. More broad-reaching education journals include: Alberta Journal of Educational Research, AERA Open, (International) Journal of Educational Research, Journal of Simulation, and/or Simulation & Gaming.

Internally, within the University of Alberta, the VR experience and results of this project will be shared directly with other Faculties interested in piloting the resource with their students (e.g., Nursing, Medicine). Additionally, results of the project will be presented to number of student services and working groups focused on addressing student well-being on campus.

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