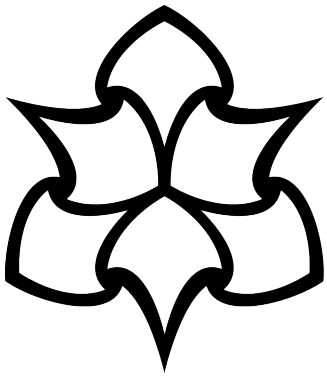

PCA026

Evaluating student perception of learning using a virtual reality experience of altitude sickness

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Virtual simulation offers the benefit of putting the user within the learned content; offering interactive lessons where experiential learning improves the rate at which we understand new concepts (So *et al.*, 2019; Angel-Urdinola *et al.*, 2021). As educators, we aim to provide learners with 'real world' scenarios whilst allowing learners to fail in safe and controlled simulated environments. Evidence supporting simulation learning appears in medical and nursing literature, little is known of student perception of simulation learning in basic science, or building confidence in application of threshold concepts beyond laboratory environments associated with basic sciences. It is unknown as to whether simulation learning is effective in promoting confidence in threshold concepts compared with lecture learning.

This study was approved by the Science and Engineering Research Ethics Committee, Manchester Metropolitan University. "Exercise and Environmental Physiology", is a level 5, 30 credit unit as part of BSc (Hons) Human Physiology. Students were administered an anonymous survey after a 2-hour lecture session on altitude physiology and 1-hour Computer automatic virtual environment (CAVE) simulation. Student confidence in identifying the signs and symptoms of altitude sickness and word association of students feelings in identifying signs and symptoms of altitude sickness was assessed. After CAVE simulation, students were surveyed on their perception of the experience and whether it added to the learning experience. Students rated from "Strongly Disagree", "Disagree", "Neither Agree nor Disagree", "Agree" or "Strongly Agree". Word associations were 9 options and/or free text. Differences between student confidence identifying signs and symptoms and word association of perception toward identifying signs and symptoms were assessed using χ^2 goodness of fit (SPSS 28, IBM).

After CAVE simulation, 80% (n=10) "Strongly Agree" and 20% "Agree" with being able to identify signs and symptoms of altitude sickness, compared with 0% "Strongly Agree" and 71% "Agree" after lecture (n=7) ($p<0.001$). Words associated with the lecture activity when compared with CAVE simulation were different (Figure 2; $p<0.001$). 100% "Strongly Agree"/"Agree" they enjoyed CAVE simulation, felt it helped improve knowledge and skills in addition to lecture, was engaging and would recommend to others for applying knowledge to real-world scenarios. 90% "Strongly Agree"/ "Agree" that the CAVE simulation covered what they expected, met learning needs, was appropriate to aid learning, was a high standard, easy to follow, gained new knowledge and learned how to apply knowledge to real-world scenarios. 80% "Strongly Agree"/"Agree" that it exceeded expectations. Some respondents however responded with themes of "Pressure", "Stressed" and neutrally in learning efficacy, suggesting some felt this environment is not conducive to confidence and learning. Despite this, those students did still respond with agreement to gaining/applying knowledge and understanding threshold concepts.

The CAVE environment presents an exciting and innovative way for educators in basic science to expose students to real-world scenarios in a safe, controlled environment and simultaneously meet threshold concepts of learning. Some caution however is advised in creating experiences where all students feel able to participate and to not exceed stress thresholds where learning may no longer take place (Vogel & Schwabe, 2016).

Angel-Urdinola D, A Castillo-Castro C & A Hoyos A. (2021). Meta-Analysis Assessing the Effects of Virtual Reality Training on Student Learning and Skills Development. World Bank. So HY, Chen PP, Wong GKC & Chan TTN. (2019). Simulation in medical education. Journal of the Royal College of Physicians of Edinburgh 49, 52-57. Vogel S & Schwabe L. (2016). Learning and memory under stress: implications for the classroom. npj Science of Learning 1, 16011.