Virtual Reality in Education: The Impact of VR Supported Lessons on the Learning Experience of Postgraduate Diploma in Education (PGDE) Student Teachers

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Introduction

This study is intended to examine some of the concerns expressed by teachers about the implementation of Virtual Reality (VR) in school Education. It aims to address the need identified by Cooper (2019) for further research into how Pre-service Teachers (PST) integrate this technology into their pedagogy and how teacher educators can facilitate and support this process. The research question aims to explore to what extent a combination of student experience of VR, in the context of learning about effective pedagogy techniques in Initial Teacher Education (ITE) courses, followed by student planning VR supported lessons, could assist student teachers in overcoming some of the barriers preventing the integration of VR into regular classroom practice.

VR is an immersive, multisensorial, 3D experience (Gigante, 1993) created with software which replicates the real world (Sherman and Craig, 2019). Research has highlighted an exponential increase in VR applications within several fields, such as military training, architectural design learning and education (Cipresso et al, 2018).

According to Riva (2019), VR shares with the brain the same basic mechanism: embodied simulations. Based on this theory, the brain creates an embodied simulation to predict actions, concepts, and emotions which contributes to the process of memory formation and learning. Cognitive neuroscience defines learning as an integrated process which is characterised by positive and negative interactions between neurons generated mainly by activity-dependent processes alongside with motivation, social and emotional experiences (McClelland and Ralph, 2015).

VR allows for direct interaction with the environment promoting active learning (Allcoat et al., 2018). According to Allcoat (2008), VR supported lessons in Higher Education can enhance self-rated positive emotions, memory/recall skills and increase levels of engagement when compared with those taught using established teaching approaches. In addition, when compared to other computer-generated reality such as Augumented Reality (AR), VR has a greater positive impact on learning information integrated into visual modalities (Huang et al., 2019).

The emerging VR Education Model (Cooper et al., 2019) illustrates the kind of positive impacts that this technology can have on learners; however, there may be barriers to its implementation in schools such as teacher attitudes and beliefs towards innovation (Blazar, et al., 2017). PST, although willing to use VR in their classrooms, also express concern about their self-efficacy about the pedagogical potential of the technology, its safety in the classroom and technical support (Cooper et al., 2019).

This contribution is intended as a pilot study which will focus first on the observation of VR supported lessons carried at a school in Edinburgh, where professional conversation with the school's Head of eLearning clarified several possible technical issues.

The focus will then move on to examining the risk assessment carried in collaboration with Scottish Schools' Education Research Centre (SSERC) (SSERC, 2020).

Ultimately, this presentation will explore creative ways to integrate VR with existing effective pedagogy techniques in ITE courses. The experimental design, of this pilot study, has been carried out at the School of Education, University of Glasgow in October 2019, by the implementation of VR supported lessons integrated in the PGDE primary course with the participation of 198 students. Preliminary data has been collected from February 2020 to August 2020 with the application of an online survey. The overall results of this study will contribute substantially to promoting an evidence-based reflection on the positive development of PST's self-efficacy on VR's pedagogical potential.

Methodology or Methods/ Research Instruments

Observation stage: An initial observation was carried out by visiting a school in Edinburgh to inform our decision on the most appropriate VR technology for this study and to support our seminar design.

Risk assessment: A collaboration with SSERC finalised several recommendations, implemented throughout the study (SSERC, 2020)

Participants: The selected sample for the pilot included 198 PGDE primary teacher students 2019-2020 from the School of Education.

External variables: Age, gender and STEM background have been largely identified as factors affecting teachers' technology self-efficacy (Sabic, 2019). The Survey has a section A with questions aimed to have a clear knowledge of these areas in the targeted sample.

VR Equipment: ClassVR® Avantis

Intervention:

Phase (1) A pit-stop tour of active learning methods in preparation for an on-campus teaching session weas organised for PGDE primary student teachers who, in a meta-level approach had the chance to test several teaching tools, moving from traditional peak flow meters and body organ aprons, to virtual reality ClassVR headsets with an immersive virtual tour around the body.

Participants were then randomly assigned to the VR or other pedagogy techniques for their microteaching session in phase 2

Phase (2): The following week PGDE primary student teachers had to plan and deliver similar lessons, in a micro-teaching cooperative style (Stahl et al., 2016) to the P6 pupils of a local school, who were invited to visit the School of Education, by applying some of the pedagogical tools explored in phase 1 (University of Glasgow, 2019).

Data collection:

During Spring-Summer 2020 participants received an online questionnaire aimed to identify the impact that practicing VR technology had on their beliefs and attitudes towards it. Unfortunately, due to the disruption caused by the Covid-19 pandemic, only 35 responses were submitted.

Questionnaire

An inductive approach was considered with a quantitative approach based on a series of Likert scale questions and a qualitative approach with open ended questions thematically analysed.

Questionnaire structure:

Session A: Gender, age, STEM background

Session B: This is an adapted version of the Kent (2017) validated tool to measure Preservice Teachers' Technology Self-Efficacy.

Session C: Impact of ITE VR supported lessons on the teacher students' understanding and self-efficacy towards VR's pedagogical potential.

Session D: Extrinsic barriers to implementation of VR supported lessons.

Session E: Open ended questions aimed to clarify the previous sessions.

Conclusions

The network of technical support established with the school in Edinburgh and the Avantis company could further facilitate the improvement of PGDE student teachers' confidence in implementing VR in their lessons.

SSERC's health and safety recommendation for VR supported lessons could clear out any doubt on safety (SSERC, 2020)

The initial results show most participants were female with no STEM background, who considered themselves pragmatics or slightly slower to adopt innovation. Results also show a general enthusiasm to explore the potential of new technology in Education but with caution due to lack of confidence, fear to invest in wrong technology, need to try it out first with a guide before to plan to use it in lessons due to time constrains and curriculum content. Several answers highlight the essential need of effective technical support to avoid any technical issue.

Most participants to the survey show to be in the category of those students who in phase 1 had the chance to try VR technology and in phase 2 delivered a VR supported lesson to the guess primary school.

Results show that VR supported lessons in ITE had some positive impact on the teachers' self-belief to implement this technology in their practice both at the university (if given another chance) and in schools. Half of the respondents declared that ITE had significantly impacted on their confidence and "The introduction to some VR technology was worthwhile although time constraints impacted on the ability to properly understand the technology".

Future research

While this initial data demonstrates that ITE courses could have a positive impact on PST's self-efficacy on innovative technology like VR's pedagogical potential, further studies are needed to explore the most effective way to blend VR technology with several other effective pedagogy techniques to support teachers' passion and commitment to their job.

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