Impact of Virtual Reality (VR) and Augmented Reality (AR) on teachers delivering mathematics in further education

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Introduction

Virtual Reality (VR) and Augmented Reality (AR) technology have been in existence for a while, an immensely innovative development capable of transforming and enhancing life. Presently the gaming industry is making the most of this innovation and whilst this technology brings vast opportunities for all, the education sector has not fully embraced this or taken full advantage of the technology. There may be many reasons for this including lack of understanding and investment, teaching practitioners not skilled in using this technology or do not know how to best use these tools pedagogically. Other reasons could be to do with pressure of having to cover a curriculum within a tight timescale with a view to maximising learner outcomes which can often lead to being risk averse and perhaps some practitioners are set in their own ways, not willing to change.

Brent Start, an Adult and Community Learning provider for London Borough of Brent; Wembley, London, serving approximately 3,000 learners, in over 50 centre across Brent, have recently invested in developing a Virtual Learning Environment, which we fondly call The Virtual Pod (VP). The VR is fully kitted out with AR and VR technology along with a "Wonder Wall"; a fully immersive corner of the room where the floor and the two adjacent walls are fully interactive with integrated sound system. Brent Start recognises the need to develop digital technology and digital curriculum to enable Flip/Blended learning to flourish. Studies have shown the efficacy of Virtual Reality in the developing spatial ability (Durlach et al.,2000; Rizzo et.al., 1998)

We have started to convert our learning resources to digital resources so that learners are able to access learning from anywhere, anytime and anyplace. With the investment in AR and VR we are going a step further by enhancing learning through virtual stimulation and simulation, developing spatial skills and cognitive thinking without having to leave the classroom and also brining objects to life so that learners can truly visualise objects, thus provide better conceptual understanding.

However, to maximise the benefits of VR and AR for our learners, we need teachers to develop technical and pedagogical skills to make the most of this technology. Without practitioners being fully conversant with the technology, the learning will be ineffective. Teachers need to

appreciate the complexity of the technology as well as the potential it brings; be aware of the pitfalls, learn how to make topics interactive and how to develop schemes of learning oriented around VR and AR. It is also acknowledged that teachers with the help of AR can raise interest and motivation of learners, enhance learning and raise better understanding of the subject matter (Yingprayoon, 2015)

Within Brent Start, along with other Skills for Life programmes, mathematics is a prominent curriculum area with high concentration of entry levels to level 2 learners from a various socio-economic backgrounds and from various ethnicity. For some learners, attending learning is an achievements whilst other aspire to attend university degrees. Many of our learners are challenged due to social, emotional and mental well-being and many also have numerous barriers to learning including technology. With this in mind and given the nature of our learners, lacking the willingness to engage in learning, it is essential that we are able to motivate and encourage learners to participate, excite them in the learning process whilst maintaining their commitment to successfully complete their programme of study, particularly for our female learners, which represents 86% of our intake. We know that maths is often frown upon by many people, this may be due to many factors including poor personal experience in learning maths. Moreover, Geometric questions are in the main difficult and the subject matter is closely related to spatial skills and it is known that students have low achievement and have negative attitude towards geometry (Bako, 2003). Hence the need to look at new ways of improving teaching and learning that will capture their imagination.

Likewise, our teachers have differing views of educational technology, is not that they are averse to new technology or new ways of teaching, it is more about being confident, having the skills to navigate around the technology and being able to articulate and engage learners with their new pedagogical skills. In addition, it is also about demonstrating benefits of using new technology. Once practitioners are able to see the benefits not just only for their learners, but also for them in terms time and effort, they will embrace this change which will be a positive one.

Method

So in order to maximise the use of VR and AR technology, we have developed a small but focused study to ascertain the impact of VR and AR on teachers in delivering Mathematics (3D shapes) with a view to see how teachers change their pedagogy. By working in 3D space, complex 3D problems may be understood better and quicker than traditional methods (Kaufmann 2009).

We will use the Class VR Technology as the VR & AR tool and use resources developed internally using the software Paint 3D, which is compatible with Class VR, to conduct this research.

The research will focus on 6 teachers using VR and AR technology and will collect their feedback and views and how VR and AR has shaped their thinking in their teaching practice. In addition, we will collect feedback from other experts.

Workshop

In the workshops, we will be share some of the findings and advise delegates on some of the things we have learnt, we will also bring along the hardware (VR and AR equipment) together with curriculum resources for delegates to have hands-on experience in using this technology.

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