Personalized Experiential Learning Using Virtual Reality to Enhance Imagination and Emotional Connectivity in Skills-Based Courses

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Abstract

Experiential learning is a philosophy and methodology in which educators plan to engage learners purposefully in direct experience and focused reflection to develop skills and knowledge, clarify values, and apply prior learning experiences. In other words, experiential learning is an instructor's careful arrangement of a specific, interactive learning experience for students where they can develop their understanding and discover new knowledge. In this respect, different learning technologies can be used to ensure that skills-based content achieves the goals and learning outcomes, most of which are competency-based. Virtual reality is one such emerging technology which can enable learners to experience and be immersed in virtual learning environments which takes them out of the "window". In a virtual learning environment, learners get to manoeuvre learning artifacts and manipulate the perspective plane to their prior learning experiences vis-à-vis the achievement of outcomes stated in the curriculum. This paper aims to provide answers to the research question: Could virtual learning designs enable personalized experiential learning to enhance imagination and emotional connectivity in skills-based courses in the new normal. As a result of the Covid-19 pandemic, many differentiated learning environments have been initiated such as ODL, blended and hybrid learning. In all these new initiatives, learners are still placed within the "4-walled classroom atmosphere" where learning is "confined to small, crowded, and neat spaces". The researcher has observed that this has led to limited imagination, lack of emotional connection and has demotivated learners, resulting in poor quality products, especially in a skills-based learning environment. These observations are also supported by Latchem (2017) in an edited book 'Using ICTs and Blended Learning in Transforming TVET' which states that the common problem of distance learners is having limited contact with educators and their peers. According to Fleming (2021), advanced technology such as VR will ensure immense personal engagement and participation in a 21st century classroom as learning will involve artificially digitized content that resembles real life situations.

Keywords | Personalized Learning | Experiential Learning | Open Distance Learning | Learners' engagement | Virtual Reality | Emotional Connectivity | Imagination | Illustration | Visual Development | 3D | Animation |

Background of Study

High quality digital content creation takes up an enormous amount of time. According to Scribble Studios (2017), an animation series of twenty-six episodes with eleven minutes in each episode can take up a total of 5 years to complete. This has resulted in the animation industry constantly searching for smart and quick production solutions for digital content such as animation series and movies. Another related instance is by Fujita from Oculus Story Studio who was constantly on the lookout for smarter technologies in utilizing the technologies in virtual reality to solve the issue of immense time taken up to created animated series. After many stages of iteration, Quilez and Fujita (2015) developed a virtual reality painting tool called Quill. Based on this development, Fujita shared his experience and stated that virtual reality is a wonderful invention and has truly opened the door to new art forms that allow designers to immerse themselves in imagination. As a result, his remarkable experience and development has made the industry demand more for VR solutions. As Quill starts to expand and develop to provide convenience for the animation and games industry, "a VR artist" became a new job scope offered by the industry. From then on, educational institutions had constantly aimed to discover the most enduring ideas and processes in a way that can attract and equip the next-generation digital learners using VR to meet this demand. However, the Covid-19 pandemic created a void in the learning process and educators began to realize that learners were emotionally disconnected from their peers and educators after a prolonged confinement. Educators realised that learners needed more motivation in learning to enhance their imagination in skills-based classrooms related to arts and media, such as illustrations, conceptual art, visual art development, and 3D modelling. As such, this study aims to seek answers to the question: Could VR overcome these obstacles and create a learning environment that will provide the learner with the needful experiential and personalized learning especially to

enhance learner imagination and emotional connectivity. This study has shown that VR in ODL provides students with several insightful educational opportunities, such as enhancing the creativity of low ability learners, more personalised experiential learning, and creating an emotional connection between the students, the content, and the instructor.

Problem Statement

The Covid-19 pandemic has radically changed teaching and learning, forcing learners to continuously learn in confined spaces that limit their imagination, emotional connection, and engagement. Remote learning which can now be attended to in various forms of online environments, also bring new challenges to learning. One of the main challenge as related to a skills-based course is that learning cannot be fully maximised as it is onerous for teachers to allow learners to manipulate objects related to for example – the anatomy, spatial depth, and the behaviour of light in a three-dimensional space. Some skills related concepts are more effective when taught in a holistic approach, as some learners may have difficulty grasping these concepts when the hands-on experience is experientially missing. Therefore, holistic teaching is a crucial approach to meet the needs of all types of learners with different abilities (Mahmoudi et al. 2012). According to Dumford & Miller (2018), the repetitive teaching method of open learning using truncated strategies has also resulted in learners being less motivated and engaged. These obstacles have led educators to prepare a new approach to teaching and learning skills-based courses to meet industry demand especially through immersive technologies such as virtual reality. Thus, it is critical for the education sector to keep pace with the expanding wonders of modern technology, as a collective effort to improve the learning experiences of the next generation of digital learners as it represents an opportunity to improve pedagogy in both digital and non-digital learning environments.

Significance of the Study, Applicability, and Interest to the field

The findings of this research will offer insights into the use of VR as an additional learning design strategy for open distance learning classrooms in a new normal that can enable personalised experiential learning and enhance imagination and emotional connection with classmates, the teacher, and the learner's individual learning environment. For educators teaching competency-based courses, this study is a valuable inspiration and reference to develop new, impactful, and engaging learning designs for the next generation of learners by using ready-made VR applications relevant to their content areas. The findings of this study will also enable the education industry to implement new and emerging technologies offered in extended realities. Students and academic researchers will also be able to use this research from an academic perspective by understanding the use of personalised, experiential, and holistic learning to enhance imagination and emotional engagement through VR applications.

Literature review

Personalized Learning

Research in learning has shown that the one-size-fits-all learning that is very commonly used is not very effective. After successfully completing a learning programme, learners, even the best, are often unable to demonstrate that they have understood what they have learned (Ramsden, 1988). On the other hand, the learner-centred approach views the learner as an active participant in the learning process. In this perspective, knowledge is not something that can be given to the learner, but something that is created by the learner (Weimer, 2002). Every learner learns differently, and active rather than passive learning has been shown to promote deeper learning and lead to higher levels of learner self-efficacy, motivation, and interest (Schunk, 2012; Weimer, 2002). Personalised learning today essentially means "differentiating" instruction for students with different levels of proficiency or striving to help students progress at their own pace so that success is based on students' personal goals. (Patrick, et al., 2013). In personalised learning, student engagement is part of the process as they can take an active role in their education and contribute to their own learning. Furthermore, personalised learning allows teachers to act as guides and facilitators of learning.

According to Izmestiev (2012), Hoz was the first person to invent the term personalised learning in the context of educational science in the 1970s, when there was little to no online learning. In the twenty-first century, personalised learning has re-emerged thanks to technological advances. According to Hamdan et al. (2015), personalised learning environments are individual workspaces for online students augmented by the web, immersive technologies, and social networks.

Experiential Learning

Experiential learning is a theory and practise in which teachers engage students in direct experience and focused thought with the goal of expanding knowledge, developing skills, and clarifying values (Clark, Threeton & Ewing, 2010). This process helps students learn from their own experiences in an environment that is student-centred rather than teacher centred. Thus, the student is an important part of experiential learning as s/he need to be directly involved in the process and feel responsible for the learning activities.

Experiential learning is in high demand among higher education students. A growing number of dedicated digital platforms enable VR, which is very promising for facilitating experiential learning (Ahmed et al., 2022). Some studies have shown that experiential learning supported by virtual reality (VR) helps learners to engage in learning (Gouveia, Lopes & De Carvalho, 2011). A study by Aiello, D'elia, Di Tore, & Sibilio (2012) showed that VR with constructivist approaches increases sensorimotor activity in learning. Moreover, Sannathimmappa et al. (2022) claimed that the use of VR as a teaching tool to create a rich, interactive, and engaging learning environment has supported experiential learning through action. This means that VR is an indispensable pedagogical tool to support experiential learning that focuses on hands-on tasks.

Experiential learning is holistic in nature, and according to Teachmint (2022), a holistic learning process includes all aspects of a learner - emotions, intellect, creativity, imagination, and the physical body. This creates a comprehensive and effective educational experience. This statement is in line with Kolb's (1984, 2012) model of experiential learning, which describes learning that allows students to create or feel effective experiences for themselves. Furthermore, the technologies of VR can easily facilitate holistic learning as they allow students to connect to the subject of study.

Virtual Reality

Virtual reality is commonly referred to as a technology that allows users to immerse themselves in a digital environment especially in a three-dimensional world filled with a variety of visual, sensory, and emotional experiences. Thus, due to technological advancements, the technology of VR has spread to a variety of fields and industries inclusive of education (Everson, McDermott, Kain, Fernandez, & Horan, 2017).

In a virtual space, people are free to interact and learn as it suits their needs within the capabilities of the applications. Learning designs in an immersive virtual environment provide students with six degrees of freedom and immersive experiences that would not be possible in the real world, especially computer applications that only allow 3 degrees of freedom. In addition, the technology currently available on VR offers the flexibility to import and export artifacts into different compatible computer software (Autodesk Maya as example) so that designers can work on them as a team from different media (computer or VR). VR also allows multiple users to work on the same artifact or file at the same time in the virtual space of the online network called Metaverse. This allows learners to learn socially and immerse themselves in a collaborative environment.

VR also enables teachers to develop a learning design that allows low & mid-performing students to better understand concepts of spatial depth, perspective, form, lighting, visual development, and 3D modelling. It allows teachers to create controlled real-world experiences and scenarios for students in a virtual world and immersive environment. Since students are limited in their ability to participate in face-to-face classes, higher education institutions need to adopt technology that can replace students' limitations. Therefore, the technologies of VR, which have been proven to not only support online learning but also benefit students, need to be promoted and optimally used.

Open Distance Learning (ODL)

In the past, it was quite clear what distance learning was about and why it came into being. Today, however, distance learning can be equated with synchronous, asynchronous, remote, blended and to some extent hybrid learning supported by web-based applications. In today's education, distance learning requires the presence of a web-based, organised and criterion-referenced learning culture (Young & Asino, 2020). Distance learning is therefore seen as integrated learning that can be delivered to learners around the world through a web-based learning platform that enables high levels of learner engagement with their teachers and peers. Following the global COVID-19 pandemic, online learning technologies have evolved into many robust educational platforms. With the addition of online learning, which took place on a large scale during the pandemic, distance learning

came to be known as open distance learning. ODL with its new understanding thus has the potential to enhance the delivery of learning to a variety of learners in different geographical and socio-cultural contexts, as well as to promote intercultural understanding and communication (Gunawardena, 2014).

ODL has been shown to benefit learners in terms of learning efficiency and improve learner attendance and performance (Nkolo, 2021). In addition, students of open distance learning expect consistency and accessibility to learning resources (Allam et al., 2020). However, there are problems that need to be solved by stakeholders as attested by Gnawali et al. (2022) who identified access, efficiency, inconvenience, and scarcity as problems of ODL. The lack of engaging learning activities (Gnawali et al., 2022; Shohel et al., 2022) has affected the development of ODL around the world. It has been shown that newer technologies such as VR can enhance ODL and create new opportunities for ODL by enabling course content to be taught and presented in ways that would otherwise be difficult, if not impossible (Childs et al., 2021). Furthermore, VR learning activities create a more enjoyable, interesting, and engaging learning experience for the next generation of digital learners. The use of innovative technologies such as VR in the classroom creates authentic, experiential learning and increases participation.

Research Methodology

This study adopted a qualitative research methodology to determine whether virtual learning designs could enable personalized experiential learning to enhance imagination and emotional connectivity in skills-based courses in the new normal. Qualitative responses from eight (8) students were collected through interviews. The eight students were representative of the School of Media and Design student population. A purposive sampling method was used to select the eight students, considering student ability (low, medium, and high) and gender (50% female and 50% male) (Please see Table 1)

Table 1: Demographic data of the participants
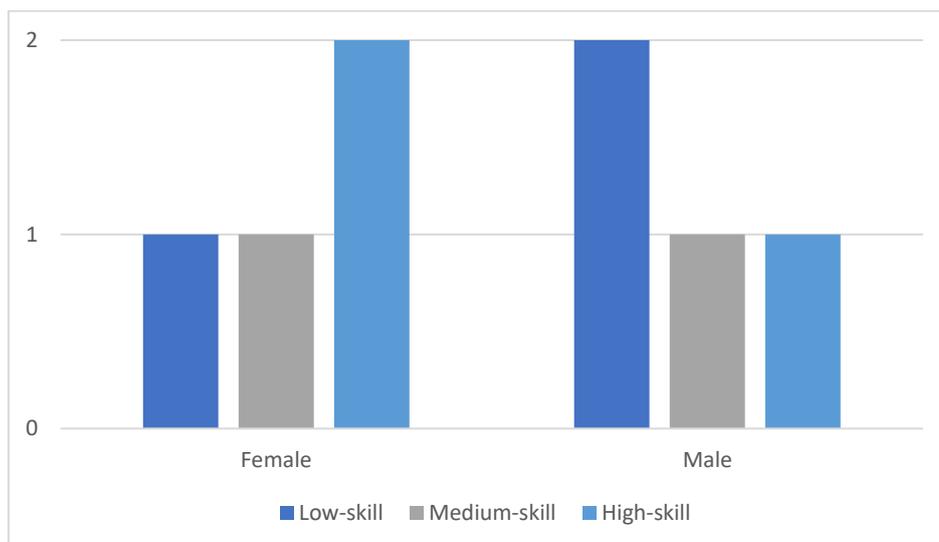
Students were selected to investigate whether the use of a simple VR application called Gravity Sketch (a cross-platform 3D creation application) using a VR device (Oculus Quest) could provide them with more personalised experiential learning, enhance imagination, and promote emotional connection with their classmates, teachers, and their environment in a skills-based course.

The experiment was conducted in the XR (Extended Reality) lab at the Asia Pacific University for use of the VR equipment. They were given a simple demo on how to use the VR application and were given 30 minutes to complete a VR exercise - creating simple 3D objects. The following image is an example of what the exercise looks like (see Figure 1).
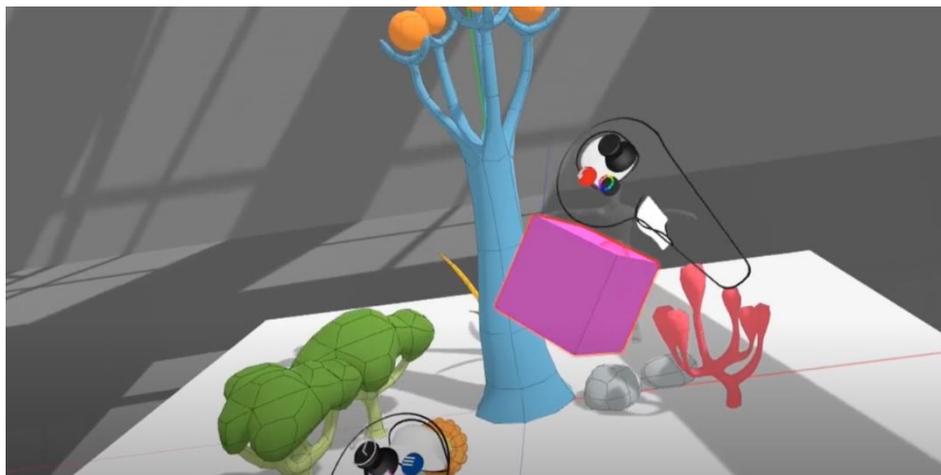
Figure 1. VR exercise - creating simple 3D objects

Note: '*Creating assets in Gravity Sketch'*, by durkatwork from: https://www.youtube.com/watch?v=JY5wTuhm04A&t=99s

Findings

Before experimenting with Gravity Sketch, students were asked about their experience of online learning during the Covid-19 pandemic between March 2020 and March 2022. They were asked if they had encountered any challenges in their online learning.

1. Challenges students faced during their online lessons:

    Most students indicated that they have a hard time focusing on their online lessons as there were too many distractions around them. For example, Respondent 1 said, *"It's a little hard for me to study or work in a comfortable space at home because there are many distractions."* One of the most interesting reasons was that they see their home and room as a place of comfort where they can rest. Respondent 2 mentioned *"the house (environment) is too comfortable for me to learn"* As a result, not only do they lose concentration, but their motivation to do something productive decreases and they report feeling uncomfortable by the prolonged confinement. Respondent 3 mentioned that *"the constant, same environment - say your room - made me feel stuck."* Many agreed that the convenience of an online classroom causes them to slack off, as it is easy to reach for the phone while sitting behind a monitor. Three (3) students pointed out that they need their classmates around them to be focused, motivated, and productive to complete their assignments. Respondent 1 said, *"I am more motivated to get my work done when I see other people working around me."* Respondent 4 said, *"I personally need people around me to focus and need that stimulation. When I am sitting in a room all by myself and no one is talking, it's really hard to concentrate."*

2. Students' emotional state during the 2 years of online classes:

    Most students said that they felt depressed, bored, and exhausted when studying in the same confined environment for a long period of time. Respondent 4 said that *"it was honestly very depressing"* as they were deprived of a social learning environment. Students pointed out that sitting in the same room for a whole day was also physically and mentally exhausting. Respondent 5 mentioned that they *"get kind of bored because we sit in front of the computer (all day).* Some also mentioned that learning in an online class has made them procrastinate much more. Respondent 2 explained, *"In the online class, there is only the computer and yourself within those 4 walls. In a confined space, it is easy to get cabin fever".*

3. Students' imagination and creativity during their online classes:

    Five out of eight students stated that their level of imagination and creativity dropped drastically during the pandemic. High performing students state that studying in the same 4-wall environment has

demotivated them to do anything productive and they no longer felt like pursuing their hobbies such as drawing and watching animation because the environment they were in does not cultivate this and the same room is now also considered a workspace. Respondent 6 stated, *"Watching anime (Japanese animation) used to be my favourite pastime, but during the pandemic I no longer find it interesting or fun. I also wonder about the meaning of life"*. Two high performing students stated that the constraints of the 4-wall learning environment caused them to perform poorly in class. Respondent 4 added: *"My imagination and creativity absolutely diminished during the pandemic. My motivation and performance (in class) dropped, and this dampened my state of mind,"* and Respondent 3 mentioned, *"I noticed that my creativity was restricted. I find myself procrastinating and I felt that I did not perform well in my online classes."*

After the experiment, the following questions were posed to the students to gauge their experiences of an immersive VR lesson:

1. Q: What were your reflections of using VR as an additional tool for personalized experiential learning.

   Five out of eight students of all ability levels said that VR is a very good additional tool to enhance students' basics skills and knowledge in 3D modelling, compared to another 3D modelling software called Autodesk Maya, where the user creates models using the computer and a mouse to navigate in a limited 3D space. Respondent 7 stated, *"I think using VR as an additional tool is helpful in some ways, as opposed to using traditional software like (Autodesk) Maya. I think using VR is helpful in blocking out (establishing basic shapes) 3D objects compared to Maya and that the 3D objects can be further polished after exporting to Maya."* They also said that Gravity Sketch is more experiential for 3D artists as it allows users to work in a very immersive environment as it is relatively easier to navigate and see their mistakes from different angles. Respondent 8 added*, "With VR it is possible to have a personalized experiential learning because it is easy to interact more through the immersive interface with the 3D models than with a laptop".*

2. Q: Could you identify what could improve your imagination when using VR to design, sketch or ideate?

   Low-skilled students pointed out that they become more creative when creating 3D models using VR as it is easier for them to visualise their ideas freely than using the software (Autodesk Maya). Responder 8 said, *"It is fun and easier (using VR) to create something out from your mind as compared to using the traditional way to create using (Autodesk) Maya."* Respondent 2 said, *"Gravity Sketch has made me more attentive and I find my creativity at a level higher than expected."* Respondent 1 added: *"I feel more immersed with what I am doing (using VR). I had problems concentrating in class, but using VR made me concentrate better."*

3. Q: What are your views of using Gravity Sketch to learn illustration/3D modelling?

   Most students at all levels said that the VR (Gravity Sketch) application helped beginners to better understand the concepts of spatial depth, shape volume and proportion as the application allows them to visualize objects in a very clear and immersive way. Respondent 5 said, *"I think when students use Gravity Sketch, they can understand the fundamentals in 3D"*. A high-skilled student pointed out that modelling 3D objects in Gravity Sketch could assist weaker students improve their understanding of anatomical drawing. Respondent 3 added: *"I have seen many artists who tend to draw their illustrations too flat and who do not fully understand the basics of human anatomy. I think VR can be a reference to easily visualize human anatomy".*

4. Q: Could you describe how Gravity Sketch helped you to connect emotionally with your environment or classmates as compared to your regular online classroom?

   Respondent 5 said, *"It is more fun to learn with VR than in an online class where the lecturer demonstrates on the computer"*. Some of the students pointed out the collaboration features of Gravity Sketch, saying that it makes them feel more connected to their environment and classmates, and allows them to ask their instructors for feedback as they complete their assignments. By learning together in a

social environment, students felt more motivated and engaged in the classroom. Respondent 8 added: *"It would be fun if VR was implemented in a class because it allows everyone to work in the same (virtual) space."*

Discussion

From the findings, the following are some discussion points:

1. Students were able to quickly identify their errors by using the viewport of VR with 6 degrees of freedom while manipulating the 3D objects.
2. VR applications enabled low ability students to better visualise and become more creative when interacting with 3D Models.
3. Visualization of real-world objects became clearer and aided to the sketching abilities of students, especially among the low ability.
4. Learning motivation was high as the immersive environment in the virtual space minimised distractions and enabled students to better focus on their online lessons.
5. Students were enthusiastic about the collaborative features offered by VR and can work with the lecturer in a personalised approach.
6. The virtual space helps students to learn in an experiential manner.

Recommendations

1. Conduct more experiments with larger cohorts of students to allow for better generalisation of the results.
2. Use different VR applications to determine if the results are consistent.
3. Create new VR applications relevant to Asia Pacific University students.
4. Conduct further interviews, especially with lecturers, to find out their views on using VR and AR to enhance creative imagination and emotional engagement.
5. Use reliable frameworks to create a checklist to measure imagination and emotional connection and use this as a basis to improve extended reality environments.

Conclusion

This study examined the use of VR to enhance personalised experiential learning in higher education. The results suggest several challenges for ODL students, such as difficulty concentrating during online classes and a decline in motivation and imagination. The findings suggest that the development and implementation of VR in ODL could enable more personalised experiential learning in a blended learning environment, increase imagination, and create an emotional connection between learners, content, and instructors. This study has shown that VR in ODL provides students with an enhanced learning experience by minimising distractions, increasing creative imagination, and personalising the learning approach. Therefore, effective teaching approaches that use immersive technological tools that fit within the context of personalised experiential learning are needed.

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