

Student perceptions of virtual reality use in higher education

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Abstract

Purpose – This paper provides an analysis and insight into undergraduate student views concerning the use of virtual reality technology towards whether it has the potential to support and provide novel pedagogical avenues towards teaching and learning in higher education. The purpose of this paper is to ascertain student views about the application of VR technology within their degree programmes from a pedagogical perspective in addition to identifying potential challenges to VR adoption.

Design/methodology/approach – The research design adopted a mixed methods approach through the use of a questionnaire that was disseminated to undergraduate students studying in the discipline area of the creative industries. Through a series of open and closed questions, student views on VR adoption in higher education were analysed both quantitatively and qualitatively. The results were analysed statistically through a series of Mann–Whitney and Kruskal–Wallis tests. The qualitative statements were contextualised in the overall perspective of the research with the more relevant viewpoints identified to coincide with aspects of VR discovered in the literature.

Findings – The predominant findings of the research indicated that the majority of the students considered the use of VR to have useful pedagogical implications though not all findings were positive. The findings provided a sound overview of the benefits and potential drawbacks of VR use in general with a more specific focus in an educational context.

Research limitations/implications – Limitations of the research include the lack of overall generalisations that can be formed from the study due to the sample size and the fact that the results were based from one specific academic institution.

Practical implications – The findings of the research will provide educators with an insight into various perceptions of VR adoption within higher education. This will aid towards allowing them to reflect on whether VR is an appropriate tool to integrate within their curriculum and pedagogical approaches towards course delivery.

Originality/value – Though several studies have explored the use of VR in multiple contexts and subject areas, there still needs to be more research towards its potential drawbacks in a teaching and learning scenario and how to resolve these issues.

Keywords Virtual reality, Presence, Engagement, Higher education, Immersion, VR technology

Paper type Research paper

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1. Defining virtual reality

Various definitions of virtual reality exist in the literature according to perspective. For example, virtual reality can be viewed from functional and technical stand points (Fuchs *et al.*, 2011; Fuchs *et al.*, 2017). From a rudimentary position, the main aim of virtual reality is to create the illusion of being in another place or immersed in a different environment. The concept of immersive virtual reality is dependent on the VR technology to achieve this experience (Konstantine *et al.*, 2014). In the domain of VR, the notion of presence relates to a “psychological state or subjective perception” of an individual which is generated through the use of the VR technology (International Society for Presence Research, 2000). Defining virtual reality can be problematic in the sense that definitions of the term also relate to the applications and techniques on where it is applied (Fuchs *et al.*, 2011; Fuchs *et al.*, 2017). Furthermore, Ludlow (2015) states that virtual reality technologies can be classified into distinct categories: true virtual reality; mixed reality; and augmented reality. True virtual reality allows for an imitated world to be created that immerses the user. In contrast, mixed reality integrates and embeds the artificial world with the real one to enhance the user experience. It is however distinct in the sense that it adds information to the physical world in conjunction with the real world (Fuchs *et al.*, 2011; Fuchs *et al.*, 2017).



Despite the various perceptions of how you define virtual reality, the concepts of immersion, interaction and presence are often associated with it. However, the hardware and software used to transform the interaction from the real world to the virtual world need to be considered due to use of equipment such as VR headsets and tracked handheld controllers. According to Fuchs *et al.* (2011) and Fuchs *et al.* (2017), virtual reality is both scientific and technical in nature, making use of computer science and behavioural interfaces to facilitate real-time interaction in a virtual world. One of the salient outcomes of VR is an experience equating to “pseudo-natural immersion”. Pan *et al.* (2006, p. 20) state that VR is “the use of computer graphics systems in combination with various display and interface devices to provide the effect of immersion in the interactive 3D computer-generated environment”. Another definition provided by Schofield (2014, p. 26) states that VR technology encompasses “[...] interactive, real-time, three-dimensional graphical environments that respond to user input and action, such as moving around in the virtual world or operating virtual equipment”. It has been stated that three of the main characteristics associated with VR are the qualities of immersion, interaction and imagination (Hafner *et al.*, 2013). Furthermore, VR technology is continuing to permeate into educational settings at an accelerated rate. The pedagogical affordances of VR have been acknowledged from a tertiary perspective assisting students to enhance, for example, their social and communication skills (Hafner *et al.*, 2013).

Though the application of VR appears to be moderately prevalent from an empirical viewpoint it could be argued that the majority of studies predominately focus upon the context or application of VR in relation to subject area and discipline (Kavanagh *et al.*, 2017). The basis of the research presented in this paper was to ascertain creative computing undergraduate students’ views about the use of VR technology within their respective programmes. Students were primarily asked to reflect via a questionnaire what their general perceptions of VR were, its applications from a pedagogical outlook in addition to whether it might provide beneficial teaching and learning benefits within their programmes.

2. VR technology

2.1 VR headsets and optical trackers

There are various types of VR technology such as the headsets, display screens and optical trackers. For example, VR headsets such as “Google Cardboard” have been developed for smartphone use (Preston, 2018, Figure 1). One of the benefits of the “Google Cardboard” is its affordability and basic design and usability for the user. Though the performance of smartphone-associated headsets have limited functionality, an added benefit is the ease of use connecting the headset to your computer (Fuchs *et al.*, 2011; Fuchs *et al.*, 2017). In contrast, the Gear VR headset is centred around smartphones though provides a head band but is more flexible about adjusting the headset to aid intra-ocular distance (Fuchs *et al.*, 2011; Fuchs *et al.*, 2017). Different headsets can also provide different parameters of view with the Star VR apparently being the most significant in terms of accommodating vision.

In conjunction with the VR headsets the tracked handheld controllers provide users with a sense of interaction to manipulate objects in a virtual world or environment. Benefits of the controllers are that they enhance the immersive experience of the user providing a sense of realism and presence. The benefits of the controllers are that they are wireless thereby allowing users greater freedom to move objects and engage with them in virtual scenarios. It should also be noted that some VR technologies incorporate the use of datagloves as illustrated in Figure 2 (Newton, 2016) which follows the movements of an individual’s fingers and is aware of the position of their fingers (Fuchs *et al.*, 2011; Fuchs *et al.*, 2017).



Figure 1.
Google Cardboard
headset



Figure 2.
Manus VR virtual
reality gloves

It has been stated in the literature that virtual reality devices are associated with two specific concepts of immersion, namely, sensory richness and interaction (Fuchs *et al.*, 2011; Fuchs *et al.*, 2017). In the context of VR, the notion of immersion relates to the “objective level of sensory fidelity a VR system provides” (Bowman and McMahan, 2007). In addition,

VR technology has the ability to provide interaction and sensory stimulation (Fuchs *et al.*, 2011; Fuchs *et al.*, 2017) that relates to the concept of presence. In the context of VR, presence relates to an individual's "subjective psychological response to a VR system" (Bowman and McMahan, 2007).

Despite the immersive benefits that VR technology provides to its users, the technology itself and its practice provide at present certain challenges relating to issues of health and cybersickness. Cybersickness is akin to motion sickness where users can experience this from wearing the head-mounted displays. It has been stated that at present more needs to be understood in relation to their long-term effects especially for adolescents (Steinicke, 2016).

3. VR uses and pedagogy

The application of VR technology is gradually becoming more prevalent within higher education settings. According to Ravipati (2017), it is predicated that VR devices will surge in use by 85 per cent by 2020 with VR technology becoming more accessible and affordable for higher education institutions. However, it has been stated that there is an apparent lack of understanding concerning the pedagogy that can inform the design and use of VR systems (Fowler, 2015). Johnston *et al.* (2017) maintain that VR use in educational contexts can support student-centred learning and collaboration thereby providing students with important critical thinking skills. Furthermore, Johnston *et al.* (2017, p. 2) argue that VR technology embedded within a curriculum has the potential to accentuate and facilitate student "[...] engagement, accelerated learning, increased learner attention [...] can support challenged learners".

Studies in the literature have indicated that VR technology may be effective in terms of aiding collaboration and communication thereby supporting the concept of problem-based learning within a curriculum (Jensen, 2017). Whilst it has been asserted that an obstacle towards adopting VR technology in education might relate to how educators comprehend the underlying pedagogy surrounding their design and use (Fowler, 2015), some empirical studies have associated the learning theory of constructivism with VR (Aiello *et al.*, 2012). It could be argued that the immersive nature of VR supports interaction and establishes a sense of presence and assists the process of knowledge construction in terms of a dynamic learning environment. This perspective also lends weighting to VR technology accommodating experiential learning (Xu and Ke, 2016) where students can learn and gain knowledge from their experiences and reaction to them in addition to learning through the process of experimentation via VR.

From a learning perspective, it has been argued that VR technology raises important questions concerning the aspects of cognition, epistemology and reality itself (Shin, 2017). Furthermore, it can be stated that VR can be considered as being a heuristic tool where users of VR technology can acquire skills such as spatial socialisation, sharing ideas, data visualisation and experimenting with things in real time (Shin, 2017). VR technology has been applied in various educational contexts within higher education such as languages, maths and science. For example, in medical education, VR environments have the potential to replicate the artificial reality where users can replicate surgical procedures in a virtual surgery environment whilst receiving visual and haptic feedback (Bernardo, 2017).

In the context of teaching and learning, the use of games-based learning has been applied with VR technology for mastering new skills, sometimes in a training capacity. At a rudimentary level, games-based learning can be defined as "learning that is facilitated by the use of a game" (Whitton, 2012, p. 1337). In addition, the use of simulations and serious games when combined with VR use has the potential to aid student engagement and retention of skills. The term serious games and games-based learning are used

synonymously though games-based learning can be viewed as a subset or a branch of serious games (Hainey *et al.*, 2013). Serious games are “games primarily focused on education rather than entertainment” (Miller *et al.*, 2011, p. 1425). Serious games have been applied in various industry and education scenarios such as surgery, medical purposes, construction management in addition to areas such as weld or military training (Miller *et al.*, 2011, p. 1425).

4. Prior VR research

Several empirical studies have been undertaken that have researched the use of VR in educational contexts. Some studies have also adopted a more theoretical and conceptual approach when researching this topic. For example, Pantelidis (2009) presents a model on how best to apply the use of VR in educational and training contexts. The model makes reference to the fact that VR use in education can be influenced by course objectives as well as the technical determinants to run the VR technology. Abulrub *et al.* (2011) discuss the use of virtual reality and how it can be applied towards teaching and training engineering students. The study acknowledged that the factor of cost remains a key challenge when implementing VR in educational settings. However, advances in the technology will through time make it more affordable. VR use has also been associated relatively predominately in the domain of medical education (Kilmon *et al.*, 2010). An empirical study by Huang *et al.* (2016) involved creating real-time interactive software (VR4MAX) to develop a prototype 3D VR learning system. Within the context of the study, a questionnaire was disseminated to students to ascertain their views concerning learning via VR applications. Based on the technology acceptance model (TAM) model, a conceptual model was tested when evaluating learner attitudes towards the acceptance of VR learning systems. Results indicated that the factors of interaction, immersion and imagination had a positive impact on perceived ease of use and perceived usefulness of behavioural intention to use virtual reality. The constructivist approach to learning was identified as a suitable pedagogical method towards underpinning student immersion and interaction using virtual reality learning environments (Huang *et al.*, 2010). The case studies undertaken in the research identified various conclusions and implications concerning the use of VRLEs in higher education such as the usability of VR applications with more research required as to what causes motion sickness. It was also acknowledged that educators might be challenged on how to implement a VR course within their curriculum in terms of course design, practice and programming skills. Aspects associated with cost and the debate about whether learning in reality is more effective were also reflected upon.

5. Methodology

The methodology used in this research was a mixed methods approach (Plano Clark and Ivankova, 2015) that incorporated both qualitative and quantitative elements via the dissemination of a questionnaire that included a set of closed and open questions. It was decided that in addition to the closed questions, the open-ended questions would provide further context and meaning to complement the views of the participants regarding virtual reality and its use within higher education.

The questionnaire was designed to ascertain the views’ of undergraduate students about VR use in the creative computing programme at the University of the West of Scotland. Due to being in the creative computing programme, the majority of the students were familiar with the concept of VR though not all of them had used it for pedagogical purposes. The questions that informed the questionnaire were identified from the academic literature pertaining to the subject area of VR. The questions were designed to gain participant responses that would either substantiate or refute what has been discussed in the academic literature concerning the merits and drawbacks of using VR technology in higher

educational contexts. The questionnaire was an internet-mediated questionnaire as it was completed by the respondents online via the use of SurveyMonkey. There was no hypothesis testing conducted in this research as the aim was to ascertain, compare and contrast independent views about VR use in higher education as opposed to testing a theoretical construct.

Prior to undertaking the study it was acknowledged that there are various research models that could have been applicable in employing towards the research. The TAM as proposed by Davis (1989) could have been applied to the research student acceptance and use of VR technology in a practical context in the classroom. In contrast, task-technology fit (TTF) as devised by Goodhue (1995) posits that technology can have a positive impact on the individuals using it if the capabilities of the technology match the tasks that the user is performing. Another theory that could have been adopted in the research is diffusion of innovations (Rogers, 2003) which is used to try and explain how, why and at what rate new ideas and technology spread among people. The authors acknowledge that these theories could have been used in the context of the research. This particular study predominately focuses on initial views and perceptions of VR technology use in higher education as opposed to evaluating or measuring its performance in practical scenarios.

For students undertaking the games development, games technology and computer animation programmes, VR technology is becoming more prevalent in domains such as games-based learning, serious games and gaming experiences in general. The students' pedagogical knowledge in general was predominately limited to their own learning experiences associated with their respective programmes. More specifically, the questionnaire was created to ascertain student perceptions about VR technology, its potential pedagogical uses within the students' current degree programme, their views about VR technology from a pedagogical perspective in addition to potential challenges of using VR technology within educational settings.

6. Results

A total of 100 participants completed the Virtual Reality Use in Higher Education Questionnaire. Of them, 81 participants (81 per cent) were male and 17 participants (17 per cent) were female and 2 participants did not specify their gender. The mean age of participants was 22.55 years ($SD = 4.38$) with a range of 17–38. A Mann–Whitney U test indicated that there was no significant age difference in relation to gender ($Z = -0.293$, $p < 0.770$). In terms of degree stream, 21 respondents (21 per cent) were from computer animation, 45 participants (45 per cent) were from computer games development, 24 (24 per cent) were from games technology, 9 (9 per cent) were from web and mobile and 1 participant (1 per cent) was from information technology.

Participants were asked how strongly they agreed that virtual reality was an innovative application that had pedagogical benefits where 38 participants (38 per cent) strongly agreed, 51 participants (51 per cent) agreed, 9 participants (9 per cent) neither agreed nor disagreed and 2 participants (2 disagreed). A Mann–Whitney U test indicated that males were significantly more enthusiastic about the pedagogical benefits of virtual reality than females ($Z = -2.233$, $p < 0.026$).

Participants were asked how strongly they agreed that virtual reality technology would enhance their learning experience where 34 participants (34 per cent) strongly agreed, 34 participants (34 per cent) agreed, 21 participants (21 per cent) neither agreed nor disagreed and 4 participants (4 per cent) disagreed. A Mann–Whitney U test indicated that males were significantly more enthusiastic about the virtual reality technology enhancing their learning experience ($Z = -2.095$, $p < 0.036$). Kruskal–Wallis tests indicated that there were no significant differences in the views between degree programmes in relation to virtual reality having pedagogical benefits ($\chi^2 = 4.928$, $p < 0.177$) and enhancing the

learning experience ($\chi^2 = 2.465, p < 0.482$). Participants were asked what virtual reality mounted display that they had used previously. The results are shown in Table I.

The most popular VR headsets previously used by participants were the Oculus Rift, The Google Cardboard and PlayStation VR. Participants were asked what particular attributes of virtual reality they liked. Due to their creative computing background, the students were quite familiar with these terms with some of them having experienced virtual reality use before though not in educational settings. The ranking of the results is displayed in Table II.

The three most important attributes of virtual reality were immersiveness, interactivity and realism where escapism and investigative attributes were considered to be the least important.

Participants were asked if they believed that using virtual technology would aid in acquiring cognitive skills and knowledge. A total of 21 per cent of participants strongly agreed, 57.5 per cent agreed, 20 per cent neither agreed nor disagreed and 1 participant agreed. A Mann–Whitney *U* test indicated that there was no significant difference between males and females as to whether they believed that using virtual technology would aid in acquiring cognitive skills and knowledge ($Z = -0.413, p < 0.679$). A Kruskal–Wallis test also indicated that there was no significant differences with regard to whether participants believed that using virtual technology would aid in acquiring cognitive skills and knowledge in relation to degree stream ($\chi^2 = 2.546, p < 0.467$).

Participants were also asked to specify if they believed that virtual reality technology could support a number of pedagogical approaches. Table III shows the rankings of the

| Virtual reality display | Ranking | Percentage |
|------------------------------------|---------|------------|
| Oculus Rift | 1st | 38.38 |
| Google Cardboard | 2nd | 30.30 |
| PlayStation VR | 3rd | 25.25 |
| HTC Vive | 4th | 24.24 |
| Samsung Gear VR | 5th | 16.16 |
| Gear VR | 6th | 6.06 |
| Google VR/Daydream VR | 7th | 3.03 |
| OSVR (Open Source Virtual Reality) | 8th | 2.02 |

Table I.
Virtual reality displays previously used by participants

| Virtual reality attribute | Ranking | Percentage |
|---------------------------|---------|------------|
| Immersiveness | 1st | 78 |
| Interactivity | 2nd | 64 |
| Realism | 3rd | 49 |
| Sense of presence | 4th | 48 |
| Escapism | 5th | 34 |
| Investigative | 6th | 19 |

Table II.
Rankings of the attributes of VR

| Pedagogical approach | Ranking | Percentage |
|------------------------|---------|------------|
| Experiential learning | 1st | 78 |
| Active learning | 2nd | 70 |
| Problem-based learning | 3rd | 57 |
| Collaborative learning | 4th | 39 |
| Project-based learning | 5th | 38 |
| Reflective learning | 6th | 25 |

Table III.
Pedagogical approaches VR could supplement

pedagogical approaches that participants believed could be supplemented through the use of virtual reality technology. The three most popular pedagogical approaches that could be supported by virtual reality technology were experiential learning, active learning and problem-based learning.

Participants were also asked whether they believed that virtual reality could enhance student self-efficacy. A total of 17 per cent of participants agreed, 48 per cent of participants agreed, 30 per cent of participants neither agreed nor disagreed and 4 per cent of participants disagreed. A Mann–Whitney *U* test indicated that there was no significant difference between males and females as to whether virtual reality could enhance student self-efficacy ($Z = -0.413, p < 0.679$). A Kruskal–Wallis test also indicated that there was no significant differences with regard to whether participants believed that using virtual technology would aid in enhancing self-efficacy in relation to degree stream ($\chi^2 = 3.521, p < 0.318$).

Participants were asked to indicate whether they believed that virtual reality technology could be potentially used in a number of areas. The potential areas for virtual reality technology use are ranked in Table IV.

The three most popular areas for virtual reality use are gaming, entertainment and education with tourism, healthcare and advertising being the least popular areas of application. Participants were asked to specify why they believed that virtual reality would be beneficial in the context of their particular degree programme in an open-ended question. The overall synthesised results indicated that virtual reality could lead to increased immersion, realism, exploration, educational and employability benefits. Some of the more interesting answers are as follows:

- “Enhanced immersion in terms of serious games as it could aid training by placing person on the scene”.
- “It would allow students to learn about virtual reality and could allow students to pseudo-experience lectures when circumstances make experiencing them difficult”.
- “As VR is becoming more popular in the gaming industry, learning with, and about it could be beneficial”.
- “Opening up the possibility of 360 degree animated video projects”.
- “Programming with VR technology would be impressive on a portfolio”.
- “Being in web and mobile development field, I wouldn’t think it’d be much helpful. But in case of computer animation, it’d be quite helpful. So I guess it depends in the subject”.

| Potential area | Ranking | Percentage |
|----------------|---------|------------|
| Gaming | 1st | 99 |
| Entertainment | 2nd | 84 |
| Education | 3rd | 83 |
| Science | 4th | 81 |
| Military | 5th | 76 |
| Training | 6th | 75 |
| Space | 7th | 65 |
| Tourism | 8th | 62 |
| Healthcare | 9th | 60 |
| Advertising | 10th | 40 |

Table IV.
Areas for potential
use of VR technology

Participants were also asked to indicate some of the problems that they believed would be associated with the adoption of VR technology. A total of 83 participants answered this question where some of the general recurring themes in the answers indicated that cost, complexity of the hardware, potentially leading to student procrastination and health issues were the more popular issues. Some of the answers were as follows:

- “The complex nature of the hardware involved would require training on part of the staff to properly teach students how to use the systems correctly”.
- “The initial cost for premium VR would be significant and even if institutions such as universities invested in the hardware it is still financially inaccessible for most students. This may limit efficiency and discourage students who want to use VR for research and/or development at home”.
- “More procrastination whilst playing around with a VR headset”.
- “Health problems such as motion sickness, nausea and eye strain”.
- “The only two problems in my opinion would be the cost of acquiring VR headsets, and the difficulty in ensuring that the computers linked to the headsets are powerful enough to use them effectively”.
- “Students could be easily distracted by the enjoyment of using VR technology and slow down learning speeds. VR technology is still evolving and one of the main issues I have with it how after a period of time your head starts to hurt from staring at a screen so close to your face, this can also slow down education as you would have to constantly take breaks from testing any tech demos/ games you create”.

In addition to reflecting upon potential problems that VR might present in pedagogical scenarios, participants expressed additional reflections about its use in higher education. Some of the responses were as follows:

- “VR could – in certain fields – be extremely useful when it comes to simulating things that would be difficult (perhaps dangerous) to do in reality, it also could allow for greater user interactivity within their learning environment”.
- “I think that there are so many opportunities where VR is a great learning tool. i.e., if you are doing history or geography it can ‘take’ you to the locations which is interesting and that is a very important thing. However different subjects I feel won’t benefit from VR”.
- “VR can help reduce Educator workloads due to the very nature of the design. Educators can target education to be more student specific with less time spent marking assignments. Feedback could also allow Educators to tailor the course/module/syllabus for increased effectiveness on a larger scale based on overall results”.
- “VR has a major downfall towards people who wear glasses (like myself) lose out in the experience because the glasses do not fit in the Oculus Rift. It is only really suited towards the science, history and art themed subjects whereas in maths and English it would be useless”.
- “It could be really effective to enhance learning, however it should not be forced, it should be optional, as seem people may not like the experience it provides, and medical care should be nearby for first time use in case there is an incident”.
- “I think VR would be beneficial as it provides a highly immersing experience and can aid students in visualising a scenario or in exemplifying key points”.

The results of the questionnaire indicated that virtual reality would be an acceptable approach to aid teaching in a supplementary capacity irrespective of course; however, males were significantly more enthusiastic about the pedagogical benefits and whether virtual reality could enhance their learning experience. Mann–Whitney *U* tests indicated that there were no significant differences on perceptions of whether using virtual technology would aid in acquiring cognitive skills and knowledge or promote student self-efficacy in relation to gender. Kruskal–Wallis tests also indicated that this was the case with regard to degree course/programme.

Immersiveness, interactivity and realism were rated as the highest ranking attributes of virtual reality technology with the potential areas of application being primarily gaming and entertainment sectors but also with educational applications. In relation to pedagogical approach which virtual reality could potentially supplement, experiential learning, active learning and problem-based learning were rated as the most applicable and popular. Overall the acceptability of virtual reality technology in all of the courses was relatively positive with the exception of a few concerns regarding expense, complexity and potential distraction of students.

7. Conclusions and future directions

The research provided in this paper explored undergraduate student views concerning VR technology adoption within their current degree programmes for the purposes of learning and making their learning experience more immersive. The overall findings of the research were predominately positive with students indicating that there are beneficial pedagogical uses of VR to be had in an educational context. It could be argued that some disciplines within the creative computing group such as games and animation foresaw more benefits of VR than students in other subject areas such as web and mobile. The salient problem or challenge towards adopting VR use in higher education was the expense of the VR equipment, potential health issues such as motion sickness or learners struggling to adapt to its use.

An acknowledged limitation of this study is the lack of generalisations that can be formed from it due to the sample size and that the results were obtained via one academic institution. In addition, the questionnaire was disseminated to specific students in degree disciplines that encompassed the area of creative computing. What might have been more beneficial would have been to undertake a cross-comparative analysis of students from differing disciplines. This would have proved useful to determine various faculty or degree perspectives as to whether VR technology can enhance the learning experience in certain degree disciplines.

In the context of VR use in higher education there are further research avenues and directions to explore. In addition to investigating the pedagogical applications of VR, it would be beneficial to determine whether VR technology is applicable towards most academic disciplines or whether it is specifically suited towards certain types. Additional empirical research can be undertaken adopting and applying the theories of TAM, TTF and diffusion innovation. Furthermore, can VR be successfully used as a blended learning approach? The challenges associated with implementing and adopting VR use in educational settings requires further research in addition to identifying how such problems might be overcome. Empirical studies of this nature will aid towards informing and increasing the awareness of educators and academic institutions towards the benefits and potential barriers towards using VR technology pedagogically.

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