

School of Education



“An investigation into the potential opportunities and challenges of using immersive technology in post-primary education”.

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Chapter 1: Introduction

1.1 Introduction and Background:

Undoubtedly, one of the most significant challenges to the Irish education system of this century will be overcoming difficulties with implementing contemporary digital technologies into everyday practice in schools. Technology has become an integral part of people's everyday lives, whether for work, leisure or education. In keeping with these developments, there has been increased interest in how educators can contribute to the development of their student's digital skillset to foster technology enhanced learning.

Ireland has developed ICT policies since the 1970's, however, each policy consistently failed to improve overall technology incorporation. More recently, improved emphasis is being placed upon policies at national and international levels which has positively contributed to a great sense of interest in digital pedagogical approaches within teaching and learning. *'Adaptive skills'* (Timperley, Ell, and Le Fevre, 2017) or *'adaptive competence'* have been acknowledged as the ultimate aim of learning in a global society. This mindset, paired with one that encourages the development of "a more digitally-empowered society and education system" (DES, 2015: 15), gave way to two new policies within the Irish context: the Digital Strategy for Schools (DES, 2015) and The Digital Learning Framework (DES, 2017).

The Digital Strategy for Schools (DSS) outlines the vision for ICT integration in Irish schools. This policy aims to

realise the potential of digital technologies to enhance teaching, learning and assessment so that Ireland's young people become engaged thinkers, active learners, knowledge constructors and global citizens to participate fully in society and the economy (DES, 2015, p. 5).

It acknowledges how in the past ICT has continuously been peripheral and not core to teaching, learning and assessment. This strategy describes ICT integration “as the responsibility of all and is a critical component of a high-quality 21st-century education system" (DES, 2015, p. 5). The DES are confident that these outcomes can be achieved by acknowledging the critical role ICT has when reforming the curriculum to equip our society with the necessary skills for the challenges posed within a rapidly changing world.

Secondly, The Digital Learning Framework (DLF) indicates practical and highly effective practice in embedding digital technology in teaching and learning in our schools. It has been developed as a result of the DSS to enact the UNESCO ICT Competency Framework for Teachers 2018 for the Irish context. Furthermore, this policy directly aligns to the dimensions, domains, and standards of the Looking At Our Schools LAOS (2016) framework for schools. This framework recognises that schools are at different stages regarding the embedding of digital technologies into T & L and acts as an enabler of self-reflection and improvement and rather than an inflexible checklist. The DLF sits very much within this agenda of the School Self Evaluation (SSE) as a tool for self-improvement, whereby schools identify and prioritise the developments they wish to improve. This framework encourages constructivism, whereby constructivist learning environments engage students in knowledge construction.

Internationally, the UNESCO Digital Competency Framework outlines teachers' competencies to effectively use ICT in their professional practice (DES, 2017). In terms of Sustainable Development, this study is consistent with Goals Four, Nine and Seventeen of the Sustainable Development Goals as issued by UNESCO. These goals have been introduced in

Ireland through the policy The Education for Sustainable Ireland (GOI, 2014/2020)

Researching technological approaches to education should be encouraged due to its ability to drive the progress of all goals (Barbara, 2018).

Immersive technologies have been in circulation for some time, and in fact, were traditionally used as a tool to train pilots when flying an aircraft (Akcaryir and Akcaryir, 2017). However, there has been a notable increase in their popularity in recent times due to the accessibility of the required technology. As a result, the potential of immersive technologies within the Irish education system has been a question of great interest in a wide range of educational fields. This dissertation's specific aim is to investigate how the adoption of immersive technologies within post-primary schools will either contribute or impede teaching and learning.

1.2 Aims of Research:

Until recently, technology for teachers was an aid to teaching and learning rather than a pedagogical approach. Students used technologies in ways that developed their ICT skills. This dissertation assesses the significance of immersive technologies as a contemporary pedagogical approach to Teaching and Learning (T & L), which may be used to overcome the challenges faced in the 21st century (DES, 2017). Within this investigation, three research questions are utilised to initiate and drive the conversation and provide a comprehensive overview for readers on this topic. On a professional level, the subject of this study aligns with policies across both the national and educational front in relation to technology. Furthermore, the immersive technologies can be explored as a means of achieving sustainable development. On a personal level, I decided to choose this title and the corresponding three

research questions, as I am confident that they will provide a well-rounded overview of the potential of immersive technologies within post-primary education.

1.3 Research Questions:

Overarching question – What are the opportunities and challenges of using immersive technology in post-primary education?

Sub questions:

1. What is meant by immersive technologies?
2. What conceptual framework underpins immersive technologies?
3. How can immersive technologies be used in post-primary teaching and learning?

1.4 Structure of dissertation:

Chapter Two will inform the reader by using a narrative literature review that synthesises the literature that is important to my research. The purpose of which is to create a deeper understanding of the given title relating to immersive technologies. The purpose of this is to create a deeper understanding of the theme of this paper. In Chapter Three, my own data sets will be utilised to compare and contrast the views given by educational scholars on the respective title. Finally, Chapter Four will present my stance as a practitioner, offer a synopsis of my findings and how they have shaped my practice. To close, I will recommend possibilities in relation to future studies conducted in the area of contemporary digital pedagogies.

Chapter 2: Literature Review

2.1 Restatement of the Research Questions:

1. What is meant by Immersive technologies?
2. What theoretical framework underpins Immersive technologies?
3. What opportunities and challenges do Immersive technologies afford Irish Post Primary Schools?

2.2 Introduction to Immersive technologies:

Immersive comes from the word immersion, which is the perception of being surrounded by something. Immersive technologies blur the boundaries between the virtual and physical worlds and enable users to experience a sense of immersion (Lee, Y.N et al., 2013). They create a virtual 3D experience whereby users' psychological and emotional state are utilised (Huang et al., 2020). Combining visual, auditory and even sensory output allows users to position themselves into a world as if they were part of it. The panels may consist of real-life locations or abstract environments such as inside the human body. Virtual Reality (VR) and Augmented Reality (AR) can be classified as Immersive technologies.

Virtual Reality is a human-computer interface that enables the user to interact with and become immersed in a digital environment in a naturalistic fashion (Trahan, M. H. et al., 2019). Therefore, users are immersed into the new environment so that they are unable to see the real world. The medium senses the participant's actions and replaces or augments the

feedback to one or more senses, giving the feeling of being present within the experience.

Google

Expeditions is an example of effective virtual reality software created by Google, which can

be found on the GSuite package. This software uses its Street View technology to display 360 degrees videos which can immerse users into over 500 locations known as '*field trips*'. The landscape does not move; instead, participants move their bodies to change their vantage point (Hall, J., 2020). Closer to home, progression in Virtual Reality can be seen from the establishment of Irish owned immersive technology companies such as SchooVR. The company's CEO is confident that "today's '*digital natives*' need more than words on a page and by creating memorable educational experiences they are more likely to remember course material" (Keogh, O., 2019).

Secondly, Augmented Reality (AR) lays virtual information and objects over the real world. It contrasts to VR, as AR enables the user to continue to see the real world, but with virtual objects, such as images, audio, video, and touch or haptic sensations superimposed upon or overlaid into the real world. Alternatively, AR supplements reality, whereas VR completely alters it (Kipper, G., & Rampolla, J., 2012). Examples of AR packages suitable for education include the Merge Cube and Curiscope Virtuali - Tee.

2.3 The importance of Kolb's Experiential Learning and Learning Style Continuum in Immersive technologies:

Immersive technologies use experiential learning as a theoretical framework. Lewis and William (1994) summarised this concept as "learning from experience or learning by doing" (5). The use of Experiential Learning was traditionally encouraged by John Dewey (1938). Within his book '*The Child and the Curriculum (1902)*', Dewey expressed the value of experiential learning, stating that it enables a deeper level of understanding. This can be

achieved by ensuring content is presented to allow the student to relate the information to prior

knowledge (Dewey, J., 1902). His mindset aligned seamlessly with that of theorists such as

Vygotsky and Piaget. They advocated for a social constructivist approach to teaching and learning, whereby pedagogy prioritises learners' T & L experience rather than the curriculum. Constructivist theorists began to question the effects of behaviourist approaches. They viewed Classroom-Based Experiential Learning as a possible antidote to teacher-centred pedagogical approaches. Dewey's efforts set the tone for experiential learning, undoubtedly inspiring scholars such as David Kolb (1984).

Today, Kolb's framework positions itself as a means of incorporating experiential learning into T & L. This framework reinforces Dewey's work, with a strong focus on creating knowledge through the experience. The four elements of this process create a cycle whereby learning is created. During this process, students must conceptualise, actively experience, reflect and retain the experience presented. The fundamental aim of experiential learning is to allow students to develop concrete experiences which empowers them to alter their perspective during the learning process (Kolb, A.Y. and Kolb D.A, 2012). Immersive technologies use presence to create spatial immersion into a mediated environment that contributes to the overall experience of learning (Weibel, D., & Wissmath, B, 2012;2011;). Highly Immersive Environments (IE) help learners achieve an improved sense of presence during the learning process, increasing positive learning feelings during the task execution.

Furthermore, presence improves the achievement of learning outcomes. This indicates that increasing the sense of presence in a virtual world environment can promote overall student learning (Huang, C. L. et al. 2020). Immersive technologies aligns with experiential learning as "these technologies show pedagogical promise of deepening student's learning experiences, allowing for more opportunity for work-integrated learning experiences and

reflection” (Jantjies, M., Moodley, T., & Maart, R, 2018: 45). Further praise for experiential learning

approaches to pedagogy can be seen in the work of Friere (1970) and Chickering and Gamson (1987), as they alluded to the increase in critical consciousness and opportunities for active learning.

The pedagogical reasoning for introducing immersive technologies into post-primary education is further reinforced by their potential to engage a range of learners simultaneously. The process incorporates all three types of sensory output. Immersive technologies can utilise all elements of the Visual Aural Read Write Kinaesthetic VARK model. It is important to value variation in learning and remember that information should not only be presented in written form (Capel, S. A. et al., 2019). Although teachers' identification of learning styles is often encouraged, research conveys a noticeable lack of credible evidence for its utility. Cuevas (2015) reminded readers that just because someone self-reports that they prefer to learn a certain way does not mean that they will learn all concepts best if presented in that fashion, regardless of the specific content. That considered, it is still important to acknowledge that immersive technologies maximises skill development by incorporating all four styles and provides students with a varied approach to knowledge creation.

2.4 Opportunities and Challenges of immersive technologies in post-primary education:

2.41 Opportunities:

The most distinctive positive feature of immersive technologies are their potential for experiential learning, whereby connections between the students' realities and learning material are developed (Fitzgerald, M., & Riva, G., 2001). However, many other strengths have been noted throughout literature and must also be considered.

Accessibility and Affordability:

Both increased affordability and accessibility have contributed to the growth in potential and emerging opportunities regarding Immersive technologies. This can be seen in Bjetivrie's papers, which expressed how the improved hardware and software availability will contribute to an increased uptake within teaching and learning (Bower, M. et al., 2020). Fortunately, accessibility has been improved, and now students can use a mobile device with an untethered headset such as Daydream View, Samsung Gear VR or Google Cardboard type viewers (Ivan, S. et al., 2019). Pairing a school mobile device or even a Bring Your Own Device (BYOD) device with free or low-cost educational apps from Google Playstore, the Apple Store, or Oculus store may be sufficient to facilitate immersive based learning (Innocenti, A., 2010). Alternatively, a school may decide to invest in standalone headsets such as Oculus Go and Oculus Quest. These alternatives have a computing system built into the headset and relinquish the need for a BYOD, school mobile device or a separate computer.

Access to a new environment:

Immersive technologies present themselves as a desirable means of overcoming some of the aforementioned constraints currently imposed on us due to COVID19 restrictions, such as travel restrictions. Immersive technologies offer a safer alternative to some learning environments. Freina et al. (2015) describe how it can offer significant advantages for learning as it allows a real-life feeling of objects and events that are physically out of reach. It supports training in a safe environment avoiding real potential dangers.

Furthermore, the opportunities of VR and AR within vocational subjects has also been realised. It is regarded as suitable for vocational training, especially if teaching or training using

the real thing is considered dangerous, impossible, inconvenient, or complex (Pantelidis, V. S, 2010). Practical and Experiential subjects benefit from using both these devices within teaching and learning to facilitate more robust explanations of scenarios that they would be unable to carry out in a classroom situation.

Promoting Key skills:

The importance of the expansion of students' skill sets has been continuously highlighted throughout the new Junior Cycle. The introduction of key skills such as communicating with others, being creative and managing information and thinking have been emphasised and must be actively incorporated into pedagogical practice (DES, 2015). Extensive insights alluded to how using immersive environments can enhance students abilities to develop a broader range of skills, leading to a holistic and improved educational experience. One of the most conspicuous concluding opportunities conferred by Duncan's (2020) study is the improved impact these technologies' have on student collaboration (Duncan, K.J., 2020). In contrast, students also improve their sense of individual autonomy as they construct knowledge through first-order experiences. The game approach used by VR also "increases the learner's involvement and motivation while widening the range of learning styles supported" (Freina, L., & Ott, M., 2015: 6).

Inclusion:

Immersive technologies also catch the interest of students with disabilities or with special educational needs (SEN). Numerous “studies analysed and shown the benefits of AR in working with students who have SEN, evidencing the work with the following populations:

auditory limitation (Carvalho and Manzini, 2017), visual limitation (Lin et al., 2016), autism

(Tentori et al., 2015), attention deficit hyperactivity disorder (Lin et al., 2016b) , dyslexia (Persefoni et al., 2016)” (Quintero, J. et al., 2019). As a result, these environments may aid in reinforcing UNESCO’s 2030 agenda for sustainable development by “ensuring that no one is left behind” (4).

2.42 Challenges:

Despite the potential opportunities presented, Immersive technologies remain contested, questioning how they improve teaching and learning. Additionally, the technological, managerial and cognitive challenges to T & L which Immersive technologies present to an education system are also problematic.

Cognitive Overload:

Interestingly, Dunleavy et al. (2009) expressed concerns during their studies with regard to “students being so engaged in the game environment that they lost track of their environment” (Dunleavy, M. et al., 2009: 13). This statement presents safety concerns, primarily if the immersive technology is being used outside. Furthermore, this over engrossment could prove counterproductive. This is known as cognitive overload whereby, the sense of presence associated with the immersive environment may impede the ability to learn as the process is made too complicated. Huang et al. (2020) concluded that there is a direct link between learner satisfaction and the effort it takes for students to complete a task, meaning if this occurs, the students may not enjoy the experience and not learn from it (Huang et al., 2020). This can also negatively affect students motivation and satisfaction during the learning experience and can lead to disengagement and failure to acquire the

learning goals or intentions (Kilic, E., & Yildirim, Z., 2012).

Pedagogical alignment:

Immersive technology continues to be somewhat scarce within the education system as research into the pedagogical application of these approaches have not moved at the same pace as technological developments. There is a limited amount of evidence-based theory into how teachers should use them, and a lack of pedagogical alignment or resources challenges ultimate uptake (Bower, M., & Jong, M.S, 2020). Despite an increase in accessibility to resources, teachers may find it challenging to ensure the resources they utilise are relevant and have a purpose in achieving the learning outcomes. Also, issues regarding the sheer lack of easily accessible content will likely limit investment in this potential pedagogical tool and hinder integration into curricula (Cook, M. et al., 2019).

2.5 Conclusion:

Engagement with relevant literature has indicated how immersive technologies can have a highly significant impact on pedagogy. They promotes the development of student skills, motivation, and autonomy while allowing them to transcend the traditional classroom boundaries—all the while using experiential learning to create experiences and presence to reach learning outcomes. While revealing the opportunities, literature also acknowledged the weaknesses this digital pedagogy presents, such as the effects of cognitive overload and challenges with the curriculum alignment. Furthermore, it is clear pedagogical application of immersive technologies has not moved at the same pace as technological developments. To overcome these issues, teachers should consider establishing collaborative relationships between Initial Teacher Education (ITE) Colleges and VR companies. These partnerships

would endorse the ultimate competency of immersive technologies and incorporation into the curriculum (McGovern et al., 2020).

Chapter 3: Reviewing my practice through the lens of a literature review

3.1 Introduction:

This chapter will present how I gathered my data sets through the use of reflective practice. Over the course of the most recent months, I have engaged in Continuous Professional Development (CPD) involving immersive technologies. This afforded me the opportunity to incorporate these approaches into my own teaching practice. The method employed for this dissertation is qualitative research, which is deemed by Freebody (2003) as perfectly suitable for education, while contributing to a highly in-depth analysis of my practice (Freebody, P., 2003). Through a process of inductive analysis, the themes presented below occurred.

3.2 Cognitive Overload:

Immersive technologies promote the fostering of active learning approaches, which is evident during experiential learning. Experiential learning can have effects on cognitive load during the task. Throughout my studies, I struggled to comprehend both cognitive load and cognitive overload fully. Utilising this contemporary pedagogy within my practice provided me with various opportunities to fully experience the fine line between both these psychologies.

Initial reflection on past experiences highlighted the negative impacts for specific students of being fully immersed in a new environment. Some students found the experience overwhelming, which meant the learning intentions became almost lost within the task.

REFLECTION 1

“December 2020, Students found the experience of VR overwhelming and ultimately, the learning intentions became lost within the task. This experience illustrated to me that there is a fine line between Cognitive Load and Cognitive Overload”.

This reflection on my practitioner experience of virtual reality is consistent with the data obtained by Kilic & Yildirim (2012). Yet, in divergence to this opinion, Reflection 2 shows how some students benefited from the total immersion into a new environment.

REFLECTION 2

“February 2021, I used SchooVR in a lesson with a small number of SEN students. I was able to show how neglected Gaeltacht landscapes within Ireland had become (see Appendix 1). The resource also provided panels of what life was like 200 years ago. This task proved powerful in teaching the students about Irish culture and more specifically how it has declined. The students were positively impacted from being immersed in a world where they could only focus on the task at hand, removed from the classroom's distractions especially as the Autism Spectrum Disorder (ASD) Unit is a shared space. Using both google glasses and audio contributed to the experience as students could truly comprehend how remote these landscapes have become”.

The above findings align with the opinion of Quintero et al. (2019), who classified VR as a suitable pedagogy for Autism Spectrum Disorder (ASD) students.

The more experiences with IVR I encountered, the more strategic I became with how I created and used content. I ensured each task had corresponding learning intentions and

learning outcomes to maintain focus during activities in the hope of overcoming the adverse

effects of cognitive overload. Having the opportunity to create content facilitated fantastic opportunities for me to align appropriate tasks with my students. These experiences illustrated the fine line between both cognitive load and cognitive overload.

3.3 Improved Partnership:

During the 2020/ 2021 academic year, University College Dublin (UCD) decided to partner with SchooVR to allow subject experts to begin creating content that could be used within post- primary classrooms. UCD students were chosen to create resources for their subject. SchooVR also offered all PME students a supplementary six-section Continuous Professional Development (CPD) online course based on immersive technologies. This move aligns with what McGovern et al. (2020) said: establishing partnerships between ITEs and educational companies can promote upskilling within the education system.

Professional conversations which I conducted with the company's CEO and founder allowed me to gain an improved insight into how I could incorporate virtual reality into my lessons. Collaboration was encouraged with other content creators and the company CEO. We conducted regular check-in meetings throughout four months to share knowledge and offer advice and feedback to one another. Before submitting the final content, I consulted with teachers from the relevant subject departments from my placement school to see if they had any suggestions.

REFLECTION 3

“February 2021, I have decided to incorporate some of the content suggestions made by my colleagues to improve the experience I am creating based on a Sraith Pictiúr (see

Appendix 2) . During the element of the Irish Leaving Certificate oral students must

explain the scene and be capable of asking and answering questions. One teacher suggested I incorporate audio so students could maximise more linguistic skills during the activity, whereby I ask them questions during the task. I have chosen to take this recommendation on board and I will now develop a suit of questions suitable for Sraith Pictiúirí which students can engage with during the task”.

The UCD School of Education decision to collaborate with SchooVR has undoubtedly promoted accessibility of virtual reality resources within the Irish context and supports the opinion of Bower, M. et al. (2020).

3.4 Financially accessible:

Before embarking on this dissertation, I would have believed that both virtual and augmented reality were not financially viable by most schools and would require a significant investment of school funding. This mindset can be seen in the reflection provided below:

REFLECTION 4

“October 2019, today in class students chatted about how they loved video games and wished teachers could think more age appropriate methodologies in keeping with the times to further engage them. One student said he hoped there would be widespread use of Virtual Reality in his lessons in the near future. I told him this would not be possible as the necessary hardware and software would be rather costly for school”.

Engagement with the CPD course enlightened me on the accessibility and affordability of viable immersive technology options currently available on the market. A SchooVR representative discussed how Oculus positions itself as the market leader and how VR kits

containing phones, goggles and necessary software may cost schools up to three thousand

euros. Contrary to this, he reminded participants that more accessible and reasonable solutions might be used, such as second-hand smartphones or Homido Grab costing approximately thirty euro and cardboard goggles costing approximately five or six euros. Personally, these remarks were revolutionary yet equally rather exciting. These findings complement what both Innocenti (2010) and Ivan, S. et al. (2019) mentioned in terms of the increased affordability of immersive technologies due to an improved range of relevant hardware and software options.

3.5 Improved safety:

Having immersed myself with school culture and community over my placement meant I often found myself involved with professional conversations with other teachers from various subject departments, which granted me further opportunities for reflection.

REFLECTION 5

“November 23rd 2020, one particular science teacher told me how he had begun using the Curiscope Virtuali – Tee (see Appendix 3), a form of Augmented Reality within his Junior Cycle lessons to teach the various organs in the body. This product provided him with a safer and more viable means of illustrating what the human digestion system looked like. He stated the visual representation consolidated understanding and how it was the closest means of showcasing the human digestive system”.

Although human bodies are often donated and used to teach anatomy to medical students, a post-primary classroom setting would most certainly not be an appropriate location for such learning approaches to be undertaken. The key takeaways from this particular reflection

relate to Pantelidis's (2010) research which reinforced the value of IVR usage if teaching or training

using the real thing is considered dangerous, impossible, inconvenient, or complex (Pantelidis, V. S, 2010).

3.6 Transform the boundaries of the classroom:

Many extracurricular activities, school trips and educational experiences which contribute to the holistic development offered by most schools have been compromised at the expense of the pandemic. Using virtual reality allowed students to immerse themselves into experiences that they could not do due to restrictions. A reflection after a class on the 23rd of March noted the following:

REFLECTION 6

“March 2021: Today, I was given a French class to supervise. Normally, when supervising a Leaving Certificate French class I would make them work in silence as I do not teach the subject. In today’s class, I tried the SchooVR’s resources which immersed students into famous French places such as Notre Dame (see Appendix 4). When leaving the class many students passed comments on how they really enjoyed the lesson and how they found it more engaging and beneficial than using just images”.

This reflection highlighted the value which experiential learning can bring to consolidate a learning experience for students. The use of presence within the virtual world allowed students to transport to a landscape which they could not travel to as a result of COVID19 travel restrictions.

3.7 Lack of Resources:

As my competency with this digital pedagogy grew, I decided to begin creating my curriculum- specific content. Working with experts at SchooVR meant my role was to provide relevant experience and the related pedagogical content specifically. Currently, there is a limited amount of evidence-based theory into how teachers should use immersive technologies and a lack of pedagogical alignment or resources challenges ultimate uptake (Bower, M., & Jong, M.S, 2020). Research presented by Cook M. et al. (2019) suggested the lack of available resources was a vital issue hindering overall progression. Research throughout this field has improved my knowledge of companies, and resources are available online. As a result, I would have to disagree with the remark made by Cook, M. et al. (2019). I am confident great work is being done by both teachers and IVR business alike on a global level; outstanding efforts should be accredited and acknowledged. In my view, the issue lies with the Department of Education and Skills, as they are not seen to promote immersive technology usage within the rigid curriculum actively. More significant efforts could be made to advance CPD courses for qualified teachers as presently it appears to be only the ITE universities' and colleges encouraging partnership. Investing in CPD for teachers and trainers is the primary determinant of successful education reform and must continue to be a priority (1999, 31) (INTO, 2017).

3.8 Conclusion:

In conclusion to chapter three, Brookfield believed that to become an “excellent teacher”, one must prepare for “the constant and ongoing search for ways to improve their teaching and

learning environments” (Miller, 2020: 1). The importance of reflection has been considered by Kolb (1984) also in his Learning Process Diagram. He believed the best means of doing so was

to complete regular reflection. A similar stance has been given by Donal Schon (1983), who also emphasised the role of a reflective practitioner in his seminal work '*The Reflective Practitioner*' (1983). This chapter has empowered me as an educational practitioner. It allowed me to critically evaluate the literature in Chapter 2 and consider how my teaching experience either aligned with or conflicted with the opinions of accredited scholars in terms of immersive technologies.

Chapter 4: Concluding chapter

4.1 What have I learned from this study?

This study has proved highly insightful to me as a practitioner of education, and I am assured that I have a more informed outlook on literature regarding immersive technologies for education, especially within the post primary setting. The scope of the term immersive technologies has been explored, and various approaches have been offered. The theoretical framework underpinning this pedagogical approach, namely, *Experiential Learning*, has also been researched considerably. I have explored the possible strengths and opportunities Immersive technologies has to offer both teachers and students during the learning process. Concerning my practice, this process has provided me with ample opportunities to reflect on my habitus and question whether my experiences align or contradict what experienced experts had to say.

4.2 How has it shaped my thinking?

I would argue these contemporary digital pedagogies' potential appears promising and something I would be eager to engage with from my engagement with literature. While potential opportunities have been considered throughout literature, reflections convey how using Immersive technologies has given me a first-hand experience of cognitive load and how it affects students in positive and negative ways. From a students' perspective, the issue of cognitive overload is always of concern.

Common themes that emerged from the data set will now be discussed, acting as crucial takeaways from this study. A takeaway from this experience for me as a practitioner would be my improved understanding of experiential learning. Throughout UCD modules, I found

myself subjected to constructivist theorists. Their approaches use methodologies that promote increased student empowerment during the learning process. It is refreshing to see this within an education system responsible for preparing students for the world of employment and much more. Experiential learning is something that I will continue to incorporate into my practice as I am now conscious of its potential within teaching and learning (T & L).

The final key takeaway is in relation to the adverse effects of cognitive load during experiential learning tasks such as those that incorporate VR and AR usage. Alternatively, this study has provided me with real-life experience with the effects of cognitive overload within my teaching. These effects can ultimately spoil a T & L experience for both teachers and students alike. The most significant difficulty with cognitive overload is its inconsistency, i.e. how it affects students differently. These issues can make using immersive technologies a hindrance to a teacher's practice, especially in large mixed-ability classes. I believe the cognitive load experienced may be due to the novelty associated with the task due to the current lack of such approaches within the education system. Conditioning students about technology may be a possible way of overcoming cognitive overload's adverse effects. This move would normalise technology usage so that it is no longer seen as a novelty.

This investigation informed me of the broad landscape offered within immersive technologies, incorporating elements such as VR and AR. Both available and hardware software were presented and their affordability.

Experiential learning was explored and I concluded how it provides a highly engaging means for students to fully enlist them within learning tasks. The work of constructivist

theorists was utilised and links can be drawn between their characteristics and those of evident

within immersive environments. Literature provided opportunities which were noted from

within literature and I drew comparisons between what they said and my own data sets. My opinion also varied from that of theorists on various occasions which was evident from my data sets.

4.3 Strengths and Limitations of this study:

The strengths perceived from this study are the findings are specific to my context. The data set presented was a collection of reflections which I conducted throughout the course of my PME.

However, some constraints prevented a complete in-depth analysis of the topic. Unfortunately, this dissertation was specific to my own context and I drew from reflections which I had completed over the course of my PME which contributed to a rather narrow focus as I only commented on my own actions. This considered, the issues of a lack of generalisability can be overcome using the attitudes of Bassey (2001). He substantiates a way of encapsulating the claims to educational knowledge of empirical research and communicating them simply to would-be users by drawing on a concept of fuzzy logic as one which asserts to what works. Furthermore, Stake (1995) advocates how it is in fact up to individual readers to make judgements from work with which they engage with.

4.4 Possible directions for the development of my practice:

Throughout literature, teaching is often described as a lifelong profession, whereby reflection and learning is encouraged. Moving forward, I am confident that I will continue to immerse myself in CPD as it appears to be the ultimate means of continuously evolving as a teacher.

On that note, it is important to emphasise the importance of collaborative relationships between all

shareholders within the post primary education system. I aim to continue my involvement in

various partnership projects, such as those offered by UCD which contribute to an improved sense of unity across the system.

The value of the contributions of practitioners can be seen from the introduction of the KAIN standards. These expectations encourages and promotes improved levels of enquiries within the field of education by providing bursaries to fund research. These projects can provide scholars with opportunities to develop a deeper level of insight, transforming them to better and more informed teachers. Academics can then share their findings and ideas with other individuals with similar interests.

4.5 Possible implications for school and policy:

Rolfe et al. (2001) reflection model encourages practitioners to reflect upon how their opinion may have changed as a through engagement with research and practice. I will use his final stage the “*Now what?*” to address what possible implications for the introduction of Immersive technologies places on school and policy.

Over the years, Ireland has developed policy after policy in relation to ICT incorporation. However, I would have to agree with the opinion presented by INTO (2017) who recommended how the government should reflect on their previous failures relating to policy in order to establish one which is both effective and achievable. Currently, Irish school’s adopt the recommendations made from The Digital Learning Strategy and the School Self Evaluation to guide their incorporation of ICT in schools. Greater and clearer efforts should be given by both the Minister for Education and Skills and the National Council for Curriculum and Assessment (NCCA) to encourage teachers and promote greater

uptake of immersive technologies. It is evident from Chapter 2 that content is being created by various subjects

experts across the world and in Ireland. However, until their efforts are broadcasted on a national level many teachers will remain unaware of their existence or ways of utilising them during practice.

4.6 Conclusion:

This study explores what is meant by immersive technologies while understanding experiential learning. Although immersive technologies presents potential challenges for post primary education, I am confident the opportunities out way the challenges. This said, I recognise that there is a need for a system wide collaborative incitive in order to facilitate optimal immersive technology incorporation into pedagogy. Ultimately, immersive technologies will never be widespread or used to their full potential within post primary schools until teachers see the potentials they has to offer. Within the Irish context, both potential and credibility are often linked to curriculum alignment. As a result, it will remain periphery within most classrooms until its purpose is strengthened and validated.

INTO depicted “the haphazard approach” to technology incorporation in the past as a contributor to the inadequacies in the system (INTO, 2017). As an industry, technology has strived throughout the last century, and it offers excellent potential as a vehicle for change within post primary schools. More recently, a sense of reliance upon technology has steamed from the global pandemic, which saw a turn to remote learning models due to society's limitations. The current generation of students is described as tech-savvy and digital natives and are often eager to incorporate technology into their learning processes. Remembering to utilise these skills is essential for teachers. It enables students to be afforded an education that promotes the necessary skills to meet current job markets and the world we live in.

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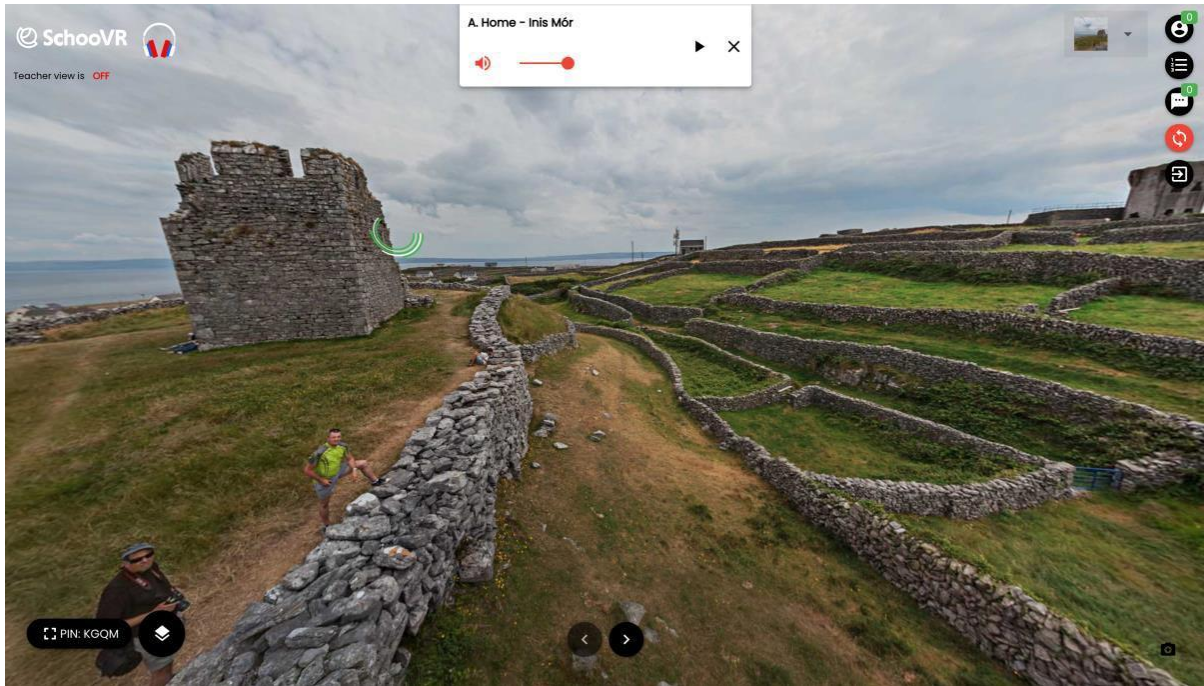
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Appendices:

Pictures from link: <https://app.schoovr.com/browse>

Appendix 1: Images of Inis Mór (Gaeltacht area)



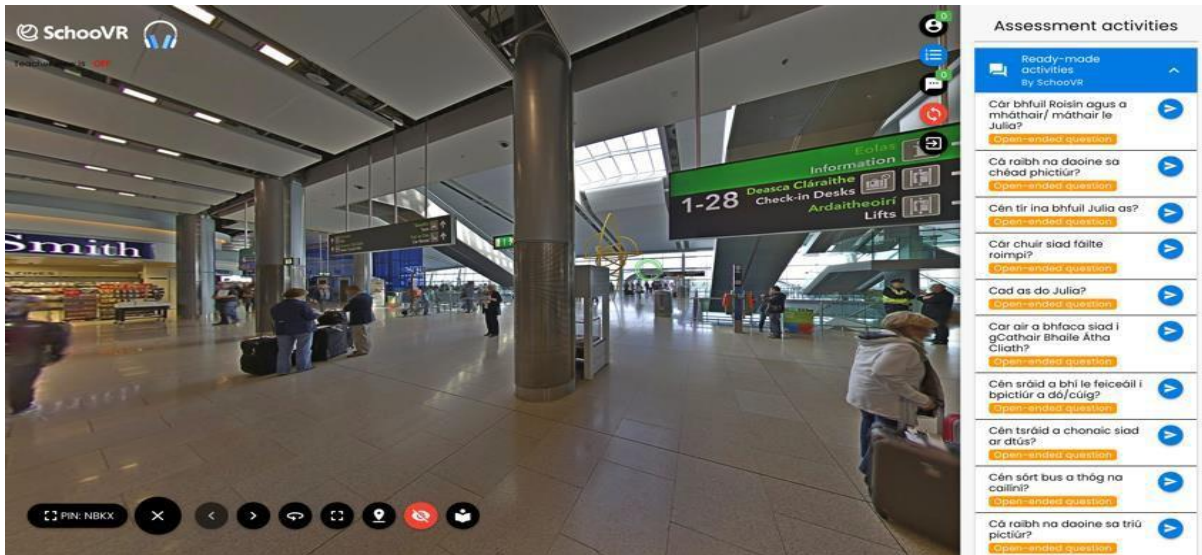
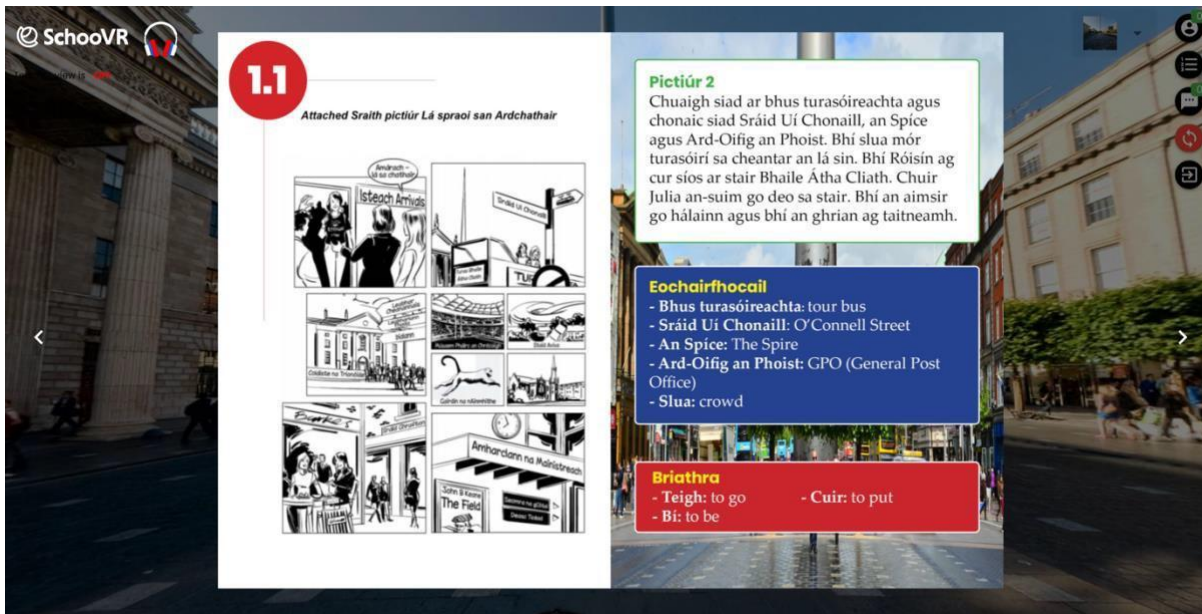


Figure 1



Appendix 3: Curiscope Virtuali – Tee



Appendix 4: Range of French experiences offered.

