A Pre-Service Teacher Immersive Experience

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Abstract
This chapter describes a study carried out at the University of Malta, where a cohort of pre-service teachers follow a study unit that is delivered entirely within a 3D immersive space. The study unit that is followed by the entire cohort of 110 participants, who at the end of one academic year will get their certifications to become teachers, focuses on ‘Integrating Learning Technologies’ in the classroom. The aim of the chosen modality is to be able to help pre-service teachers understand more about learning technologies by experiencing learning technologies themselves. We discuss this case study with particular emphasis on learning theories and approaches that underline the delivery of this study unit.

Our study motivation arises from two distinct research directions. In the first instance, we come across the teacher training challenge. Research indicates that teachers, even newly qualified teachers, may resist the adoption of new methods of teaching and learning that most often involve different use of technologies. One factor, which has been known to impinge on the way the teachers teach is the curriculum of their teacher training programs, and the type of behavioral changes it induces in relation to technology acceptance and adoption.

In the second instance, immersive environments such as virtual worlds, used for learning, are seen as highly engaging environments that can sustain a variety of archetypes and models for learning. Studies indicate how the digital self-representations in 3D immersive spaces (such as digital games, serious games or social virtual worlds) can influence an individual’s behavior in real life.

The combination of the two areas of research is presented in a case study approach as we attempt to reconcile a 3D immersive environment within a formalized teacher-training curriculum. We wish to investigate the level of acceptance of a 3D immersive education modality and whether the learning happening within these spaces is in fact taken beyond these spaces. The questions we ask are: do these spaces help people modify their behavior? Can these spaces facilitate a culture shift? Or will the culture influence the way learning occurs inside these spaces?

Key Words: Virtual worlds, pre-service teachers, technology acceptance, behavioural intention.

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1. Introduction
This chapter starts with the story of a journey into our society. In the last decade or so there has been a constant evolution or rather revolution as the society that we had got used to, flipped the coin (Robinson 2001). This version of the
society, that which is driving economy and the market place as well as politics, is one that has undergone a complete transformation. We view this same society as one that is empowered with a voice that can be heard (Seely Brown 2012) whilst the increasing economic demands, require from individuals in a society, a critical approach, that is inventive, innovative, and makes use of the collective crowd knowledge – in the belief that the whole can do so much more than the one (McGonigal 2011).

All those who are not adapting to this evolution are being left behind. Unfortunately there is much debate and speculation that unless education starts to roll up its sleeves, then the repercussions will hit back at this society and with consequences (Robinson 2001), (Seely Brown 2012). We start on our journey with the premise that education, formal and informal, is of vital importance to society, and that teachers, as the force driving the formal education, need to embrace this evolution (EUROPE 2020 A strategy for smart, sustainable and inclusive growth 2010) – creating a culture shock that resonates throughout in the education field. So it is really this notion of how to revolutionize a cultural change that has prompted us to start this investigation.

The perspective that learning in a context, within a community, is driven by social interactivity rises from a post-modernist view of learning (de Freitas and Jameson 2012). Bruner (Bruner 1993), Vygotsky (Holzman 2009), Bandura (1994), Lave and Wenger (1999), all argue that the interactive processes within a community-based social environment are important elements for making sense and extracting meaning from learning elements. From this perspective, using social-collaborative learning approaches is not a new endeavour. However the attitudes in education, that technology can, not only support, but also facilitate this approach to learning, is still far from reaching its maturity level. A number of studies show that teachers’ attitudes towards computers and technologies, most frequently are expressed in terms of reluctance and resistance to adopting tools that can be alienating within the classroom context (Abbitt 2011), (Sutton 2011).

On the other hand, we have seen the influences that immersive environments such as 3D virtual worlds, can have on engagement, attitudes and behavior. Castronova (2007) predicts an “exodus” towards 3D worlds where people drive education, economy and lifestyles within the virtual platform. And we are already seeing, albeit maybe still not at the same scale and pace as predicted, the effects that these immersive spaces are having. Studies by Blascovich & Bailenson (2011) indicate how the digital self representations inside 3D immersive spaces can influence an individual’s behavior in real life – a term which they coined as the ‘proteus’ effect. Other parallel studies by Dede (2009) discuss how the impression that one is participating in a realistic environment can help authenticate the learning experience and thus support the engagement that a learner can establish with the objects inside the space.

The story moves on to a new scope.
2. The background

Although learning can be accidental, it doesn’t just happen by accident. We believe in design for learning, and in creating the right conditions whereby accidental connections can be made. So we asked: ‘given the optimal design conditions, how effective would a 3-dimensional (3D) immersive virtual world (VW) be in affecting the pre-service teachers’ behavioral intentions towards increased technology acceptance and adoption in the classroom?’ Our motivation to study this relation between attitudes and behaviors and the 3D space arises from two distinct perspectives, each of which has already had a great deal of research and exposure to it.

The first perspective comes across as the teacher challenge. Chan & Teo (2007), Teo (2009), Hossain & de Silva (2009), have all reported gaps between classroom teaching and what goes on in the life beyond the classroom, of both teachers and students. In their studies, as well as other studies presented by Mokhtar (2005), we find that across the globe there seems to be this phenomenon, which sees a number of teachers resisting the adoption of new methods of teaching and learning that may involve different use of technologies. This is attributed to a number of factors amongst which, we find lack of supporting structures and mechanisms. However one other identified factor, which is known to impinge on the way the teachers teach, is the curriculum of their teacher training programs, and the type of behavioral changes it induces in relation to technology acceptance and adoption. There have been a number of studies and adoption of different models for technology adoption and acceptance by teachers. Both the technology acceptance model, TAM (Davis 1993) and UTAUT (Pynoo, et al. 2011), which is an applied variation of the TAM, take into account various indicators that affect the perceptions of the use of technology. However recent studies have also investigated teacher training programs with a view of enhancing their technical, pedagogical, content, knowledge components in a new model which Mishra & Koehler (2006) have proposed as the TPACK model and which subsequent studies, by Sutton (2011) and Abbitt (2011) respectively have shown might lead to an impact in the way newly qualified teachers handle their teaching in the classroom context.

Our journey takes us towards the second perspective into VWs as we explore what they are and the features, which make them so popular. One point that emerges is the immersive nature of the 3D social VWs that is constructed from the various affordances that these 3D spaces exhibit (Aldrich 2009). We find identity as one of the most important affordances that can affect the level of immersion inside virtual worlds (Thomas and Seely Brown 2009). Communication is also an essential component of virtual worlds as this helps create those virtual communities that keep virtual worlds alive (McGonigal 2011). The fact that virtual worlds can help simulate real life experiences provides an authenticity to the setting, which
transcends the fantasy world and provides a setting that learners can connect with (Reeves and Read 2009). Role-playing creates a situational experience that might otherwise be difficult to recreate in real life (de Freitas 2006).

One of the common characteristics or elements that has been described as contributing to immersion is Csikszentmihályi’s state of flow (1991), or rather this state of emotional engagement that becomes driven by a dynamic exchange between boredom and frustration, arising from least to more challenging activities. Interactivity is another affordance, in which ‘avatars’ are allowed to interact not only with each other, but also with the content, thus contributing to the virtual world (Reeves and Read 2009). The persistence of VWs renders the setting more credible as life continues to exist even when the avatar is not present. The final affordance, which is embodiment, refers to the transformation from the physical persona into the digital avatar projected inside the VW (Blascovich and Bailenson 2011). Thomas & Seely Brown (2009) propose that this embodiment, helps transform the sense of space defined by the VW into a sense of place.

In relation to the affordances displayed within the VWs, a number of studies have focused on the assessment of learning inside a VW. de Freitas and Maharg (eds) (2011) refer to a number of case studies of learning inside VWs taking into account an alternative form of assessment for learning which goes beyond the simple curricular-based recall. We therefore explore issues of self-efficacy (Bandura 1994) through an environment that stimulates project-based and continuous task-based assessment, giving learner participants in the immersive environments the possibility to explore and experience more in-depth the content held within the 3D platform.

3. The Methodology

Our case study was developed with students at the University of Malta, enrolled in a PGCE course that is being offered by the Faculty of Education. The PGCE is a post-graduate certificate in Education that trains future teachers in the pedagogy for the classroom. 117 students enrolled in the course in September 2012. One study unit with a total ECTS value of 4\(^1\), was chosen as the focus of the case study running inside the VW.

The study unit, Integrating Learning Technologies, is designed to introduce pre-service teachers to an aspect of learning that integrates learning technologies to the classroom context, in different field areas and domains. Over the virtual world,

\(^1\) ECTS is also known as European Credit Transfer and Accumulation System used to recognize and accredit various program of studies across Europe. This system would ensure student mobility across the number of institutions that adopt this credit system. Available Online: [http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm](http://ec.europa.eu/education/lifelong-learning-policy/doc48_en.htm) [Last Accessed: January 2012]
the pre-service teachers gain hands-on experience by using the 3D immersive space, to explore and discover new and emergent learning technologies that will help them during the practice of their teaching.

In designing this case study, we use the model proposed by de Freitas (2008) that describes a four dimensional framework used in 3D immersive virtual worlds to bring together elements from the learner specifics dimension to the pedagogy, in terms of representation and context. Within this framework, the learner, characterised by the different needs and competences goes through a learning pathway defined by social learning theories and characterised by 3D representation through the levels of fidelity, interactivity and immersion attained by the virtual world space, in a specific context following target goals and objectives.

![Four Dimensional Framework supporting Learning in Virtual Worlds](image)

Figure 1 - Four Dimensional Framework supporting Learning in Virtual Worlds; adapted from (de Freitas 2008)

4. The design

Our design consisted of creating a 3D space containing 3D objects, ambience and setup with an integrated content that included a number of themes to represent the study unit ‘Integrating Learning technologies’, using the course description approved by the University of Malta. We chose the themes of e-Learning and Virtual Learning Environments as well as Open Educational Resources and Social Networks in Education as some of the themes to be discussed within the VW.

We have designed the course content in a way that could provide a purpose for the participants inside the virtual world. However we also wanted to make this type of learning as transparent as possible and to incorporate some core game features
that would help our participants achieve a sense of flow that balances the level of challenge with their 'comfort-zone' within which they operate the technology-based resources.

The VW consists of 4 separate environments hosted by the same platform using two separate servers, each having a different scope. Each environment runs sequentially one after the other. Each environment with the exception of the first world environment, are of a 4-week duration. The platform we use is AvayaLive™ Engage. The 3D platform is currently being used by a number of leading enterprises to deliver innovative corporate training experiences at all stages of the employee learning cycle; from recruitment through on-boarding to assigning new skills, leadership development and retention activities. The platform has been chosen due to its ease of use, and its thin client interface that gives it ease of access anywhere with an Internet connection. This platform is based in the UK and two servers have been allocated to us for the purpose of our studies. AvayaLive™ Engage supports a number of interactive features such as verbal and textual chat interactions between avatars (on a personal and group level), personalisation of the avatar persona, 1st or 3rd person view of the world, walking/running, sitting, gesturing options, presentation of documents, sharing desktop contents, co-browse web pages, incorporating streaming video, etc.

The first world, is the orientation world. This world, is made available to the participants for the first two weeks of the course, with the aim of giving them the possibility to get used to their avatars and the interactions possible inside the virtual world. The participants are also provided with a teaser about the course content and methodology. This world is thoroughly guided, and the participants are free to explore different aspects including course logistics, objectives and general descriptions.

The second world follows the ending of the first world ended and is designed as the ‘Campus’ world with a huge auditorium and a number of breakout rooms. The world environment consists of a series of presentations, screencasts, podcasts and links to external Website, targeting more flexibility in learning. In this world, the students prepare a series of tasks. The first task is the preparation of an information seminar as they self-organise into groups. Each group presents a specific aspect on the theme of e-Learning. For this task, the participants are guided and are expected to find answers to specific questions on the theme, providing a presentation that is also related to the way e-Learning can be expressed through their teaching subject. The second task, is developed in the form of a game, as the different groups are expected to find other groups in-world and assign questions to be answered in a presentation format during the second information seminar that deals with virtual learning environments.

The third world is designed with a futuristic open environment in which the in-world residents could also sustain a social-collaborative experience. The open spaces, daylight ambience, and selection of indoor and outdoor meeting spaces,
were designed to facilitate in-world interactions, and provide an environment that is pleasant and that offers a ‘relaxed’ setting. Two further group tasks are assigned in this world targeting further social collaboration activities where the participants need to work together to provide a number of insights and tangible artefacts, which involve learning technologies.

The fourth world environment is designed with the scope of providing an added opportunity for the participants to meet in small groups and attend tutorials with the course mentor, in a way that can help them finalize their course assignment. This is given as an individual seminar paper, presented as a research proposal for a project in an area of learning technologies of their choice.

5. The Perspectives

During the course of this study unit, preliminary data has been collected using observations, recorded videos and a focus group session. The data consists of student attitudes, behaviour and general response towards the system.

The general tendency of the data towards the VW indicates an overwhelming response in the first six weeks of the course. A number of participants, who are mature students and who are also parents of children and young teenagers admitted that although they had been scared and wary, at first, they immediately took a liking to the environment. In a number of such cases participants reported that finally they were starting to understand the “world” that their own children inhabited and that it made them feel as though they could communicate more with their children. One interesting data reported that the children thought the environment was ‘really cool’ and that they were present a number of times when their mother was participating in in-world activities. In two separate cases, we were contacted by two individual participants asking for access for members of their family (a husband and a mother respectively), who found this modality not only fascinating, but also found the content extremely interesting to follow.

However this effect seems to wear off for many of the participants right after their teaching practice in schools, as indicated by the analytics collected over the world platform. During the focus group session, the participants also reported that the teaching practice stint in school was so demanding in terms of lesson planning, that they could not focus on any other university-related material. One person also pointed out that the lack of resources and support structures found in the school she was at, caused some demotivation in trying to integrate technologies in the classroom.

An in-world seminar held right after teaching practice, found a rather heterogeneous group. Although many of the group participants reported a sense of detachment between the course and what they did in schools during their teaching practice a number of other participants were discussing with the rest of the groups what technology methods and tools they used during their classroom teaching. Blascovich & Bailenson (2011) have described this translation of the VW
behaviour into physical world behaviour as the 'protheus' effect. The protheus effect is triggered by the interactions within the VWs that create a sense of engagement with content, objects and avatars that can persist even after virtual world expires.

Minocha & Reeves (2010) describe communities established in social VWs as those that collectively share a sense of being there together. Working together on a project/task based approach inside the VW has been highlighted by a number of tasks that the students have presented. During the focus group session, the participants pointed out that they felt more comfortable when they were working in small groups together on a particular task rather than when they were having whole group information seminars. They also preferred working on hands-on tasks with the rest of the group members, rather than following the content in the world on their own. We find that this perspective relates to Kolb’s (2001) experiential learning model, where learning through exploration using concrete experiences leads to increased learner engagement.

6. Conclusion

Our story is still far from reaching its conclusion. This short write-up serves to give a brief overview of the VW setting, which was used to provide an experiential learning into technologies that can be used and adopted by teachers in the classroom context. The study is designed around a quasi-experimental approach, using pre- and post-test data collection methods. Additional analytics trace participants’ activities and interactions over the VW platform whereas focus group sessions and observation studies, give insights into the participants’ behaviours, perceptions and attitudes relating to engagement in immersive education. The initial data suggests that the complexity of learning is dependent on the culture that the participants impart to the 3D modality. We have to be aware that the resistance to change may run deeper than what can be experienced over 12-14 weeks of the 3D immersive space, and that what ultimately needs to change are the convictions that 21st century education practices truly lead to individuals that have so much more to contribute to society in terms of education, leadership, entrepreneurship and ultimately an enriched culture.

Bibliography


Aldrich, C. Learning Online with Games, Simulations, and Virtual Worlds. Chichester/GB: John Wiley and Sons Ltd, 2009.


de Freitas, S. *Serious Virtual Worlds; a scoping study*. UK: JISC, 2008.


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