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Abstract

This chapter examines four papers that have been influential in the use of virtual worlds for learning, but also draws on a range of other research and literature in order to locate virtual world learning across the landscape of higher education. Whilst there is sometimes a misconception that research into learning in virtual worlds is very new, the field began to develop in the late 1990s and has continued since then. Typical examples of the first iterations of virtual worlds include Second Life, Active Worlds, and Kaneva, which have been available for up to 20 years. The second generation is currently being developed, examples being High Fidelity and Project Sansar. The chapter reviews the literature in this field and suggests central themes that emerge are: Socialisation; Presence and immersion in virtual world learning; Learning collaboratively and Trajectories of participation.

Keywords

Virtual worlds - Immersive environments - Socialisation - Presence and immersion - Learning collaboratively - Trajectories of participation
Chapter 9
Virtual Worlds for Learning

Maggi Savin-Baden, Liz Falconer, Katherine Wimpenny, and Michael Callaghan

Introduction

This chapter reviews some of the most compelling evidence regarding learning and teaching in virtual worlds. For the purposes of this review, virtual worlds are considered to be online, multi-user, immersive 3D environments in which users can interact with their surroundings and other users. Interaction with other users is normally through text and/or voice communication channels, and the new generation of virtual worlds is beginning to develop methods of shared physical interaction. Typical examples of the first iterations of virtual worlds include Second Life, Active Worlds and Kaneva, which have been available for up to 20 years. The second generation is currently being developed, examples being High Fidelity and Project Sansar. This chapter examines four papers that we deemed to have been...
influential in the use of virtual worlds for learning, however, we also draw on a range of other research and literature in order to locate virtual world learning in the broader landscape of higher education.

Understanding Virtual Worlds and the State of the Art

There is wide variation in the terminology used to describe virtual worlds and terms are invariably used interchangeably. The rationale for using learning in virtual worlds to enhance teaching and learning in higher education suggested here, is because practicing skills within a virtual environment offers advantages that complement learning through real-life practice: in particular the exposure of learners to a wide range of scenarios (more than they are likely to meet in a standard face-to-face programme) at a time and pace convenient to the learner. It has been widely acknowledged that virtual worlds do present educational potential in terms of role-playing, building and scripting items and fostering dialogic learning and social interaction (Savin-Baden, 2008, 2010). Virtual worlds can offer learners the opportunity to make mistakes without real-world repercussions, and to experience situations that may be ethically or practically difficult, or indeed dangerous, to experience before they qualify; for example, carrying out a realistic accident investigation that includes interviewing real-time witnesses (Falconer, 2013). Students can also experience immediate feedback that results from their actions, both from the reactions of other users and changes to the virtual environment; for example, a group task for paramedics attending the scene of an explosion could require the group to change their activities during the exercise, depending on feedback from the casualties and the increasing risk of a secondary explosion. In the past, techniques of adaptation and personalization have been considered in the context of virtual reality in general. The earlier techniques mainly focussed on adaptive navigation support and adaptive presentation. For instance, Brusilovsky (2001) has integrated some classical adaptive hypermedia methods into 3D virtual worlds to support different navigations for different users.

More recently there have been examples of virtual world simulations of real-world activities being incorporated into vocational education programmes at undergraduate and postgraduate level (see, for example, Duncan, Miller, & Shangyi, 2012; Gil Ortega & Falconer, 2015). Further, recent research on virtual reality and simulations would seem to suggest that transfer is more likely from virtual situations to real life situations, than early work on transfer across different real world settings had previously implied. For example, the level of motivation to learning that immersion provides is also important. Dede (1995) argues that the capacity to shape and interact with the environment is highly motivating and sharply focuses attention, and Warburton (2009) has suggested that the immersive nature of the virtual world can provide a compelling educational experience, particularly in relation to simulation and role-playing activities. Herrington, Oliver, and Reeves (2003) refer to the authenticity of the virtual settings and argue they have the capability to motivate...
and encourage learner participation by facilitating learners’ willing suspension of disbelief. Further, recent studies into virtual world learning suggest that sound pedagogical decisions and careful consideration about the reasons for using virtual worlds are needed, to ensure that the technology can be transformative in its application rather than merely being used as a replacement way of doing something tutors typically do (Wimpenny, Savin-Baden, Mawer, Steils, and Tombs (2012); Hughes, 2005; Mount, Chambers, Weaver, & Priestnall, 2009). Indeed, as Dalgarno and Lee (2010) contend, ongoing development of, and investment in, 3D virtual worlds for learning should be contingent on understanding how such environments provide advantages over other pedagogical techniques, including those offered by their non-3D counterparts.

Central Themes in Virtual Worlds Literature

Despite many cogent arguments and the varied possibilities for their use, there has been relatively little situated pedagogical rationale for the use of virtual worlds in higher education. Mayes and de Freitas have argued that “for good pedagogical design, there is simply no escaping the need to adopt a learning theory” (2004, p. 6), and this is particularly so in virtual worlds. Duncan et al. (2012) observe that there are “... rich veins of current research and practice in associated educational theory and in simulated worlds or environments, ...(but a)... paucity of work in important areas such as evaluation, grading and accessibility.” Others suggest the need for strong pedagogical scaffolding in order to support effective learning (Salmon, 2009), although it is not entirely clear why this is more the case in virtual worlds than other environments. Furthermore, there has been a notable reluctance either to situate or theorise learning in virtual worlds when turning to learning theories, such as supercomplexity (Barnett, 2000), threshold concepts (Meyer & Land, 2006) or the conversational framework (Laurillard, 2002), although the latter is seen as largely too structured for use in virtual worlds. Additional themes in the literature include the integration of VWs with other learning technologies such as virtual learning environments (Livingstone, Kemp, Edgar, Surridge, & Bloomfield, 2009). There are also an increasing number of virtual-world-specific software developments such Trainingscapes™ and Datascapes™ (Daden, 2016). These are web-delivered, immersive learning and data visualisation applications that enable a significant degree of customisation for specific learning needs. From a review of literature examining the educational uses of virtual worlds in higher education we suggest central themes that emerge are located around:

- Socialisation
- Presence and immersion in virtual world learning
- Learning collaboratively
- Trajectories of participation
In the following section, examples from four papers are used to explore each theme and consider pedagogical issues about the use of virtual worlds for teaching and learning.

**Socialisation**

The social aspects of virtual worlds have been the subject of considerable research over the past 10–15 years. Researchers have become increasingly interested in the similarities and differences between socializing in the real world and in virtual worlds. For example, a frequently cited paper by Yee, Bailenson, Urabeck, Chang, and Merget (2007), the first of our selected papers, discusses the findings of a case study that explored whether the norms of social gender, interpersonal distance and eye contact transferred into virtual world environments. They found significant similarities, such as the interpersonal distance of male–male avatars was greater than that for male–female avatars and that male–male avatars maintained less eye contact than female–female avatars. In a more recent paper, Mennecke, Triplett, Hassall, Conde, and Heer (2011) undertook a study to examine three issues that relate to collaborative interaction and task completion in virtual worlds, viz. embodiment, context and spatial proximity. They synthesised these issues with notions of presence and co-presence and continued to develop the theory of Embodied Social Presence (ESP), first proposed in an earlier paper (Mennecke, Triplett, Hassall, & Jordan-Conde, 2010). The 2011 paper discusses the findings of a case study with students on a postgraduate e-commerce course. The researchers found that 68% of the students achieved ESP at some point during the exercise, expressing this through visual, emotional and non-verbal behaviours when engaging in a shared activity. They found that when ESP is achieved, collaborators are more engaged in the conversation and the team’s shared activities. They, therefore, argue that ESP theory can inform the design of learning experiences in virtual worlds.

Jarmon, Traphagan, and Mayrath (2009) undertook a single case study and suggested that the highly interactive nature of virtual worlds, with particular reference to Second Life, provides rich opportunities to accommodate project-based experiential learning. The study by Jarmon and colleagues focused on students’ skill-levels in communicating and interacting effectively with diverse audiences of differing worldviews across different disciplines. A semester-long team project was used to develop students’ abilities to engage in cross disciplinary team working practices, for example through practising greater flexibility of outlook, and using communication strategies to enhance their ability to work and learn across disciplines more effectively. Second Life was viewed as providing an opportunity to apply and test communication strategies beyond the scope of the physical classroom. Students were required to take field trips in Second Life, interact extensively with other educational communities (for example over 200 universities and colleges as well as libraries and museums) and engage with other non-academic communities in Second Life (2009, p. 171).
The key themes emerging from the study, albeit from data from one graduate course and five graduate students, revealed the local and global learning opportunities offered by the programme, with students describing Second Life as providing an important space and context-rich setting within which to practice communication skills. Far from being limited to classroom discussion, the students were able to work with a context that provided an opportunity to be actively inventive and imaginative, pushing learning boundaries, including what it meant to learn. Students described learning in Second Life as: “safe, playful ... increasing one's own creativity” (2009, p. 174). The playfulness and dynamic nature of learning offered through using the virtual world were highlighted in enabling real life application of the theories and strategies used within the course. Despite frequent technological difficulties and students’ initial apprehension of using Second Life for collaborative learning, it was apparent that learning in the virtual world enabled students to apply, question and revise their understanding of learned theories of communication through active experimentation. In addition, the rich 3-D environment was seen to create an enhanced sense of embodiment and social presence supporting the experiential learning cycle. What was viewed as being of value was a project which enabled students to apply their learning from a project-based graduate course on interdisciplinary communication into real life practices, through work which offered tangible outcomes resulting in students creating a real life product through collaboration in a virtual world. Two virtual model homes were created in Second Life, one of which was actually reported as being built in a low-income neighbourhood. Model homes had a persistent presence in Second Life which enabled people from around the world opportunity to walk (or fly) through the “Alley Flats”, Jarmon et al. (2009, p. 173). The interdisciplinary learning opportunity was also deemed by students to be highly valued, resulting in enhanced understanding and skill development when working with others from a range of disciplines.

**Presence and Immersion in Virtual World Learning**

Themes relating to presence and immersion in virtual world learning are similarly captured in Bayne’s (2008) study, the second selected paper. Drawing on Barnett’s (2007) “pedagogy of uncertainty”, Bayne examines the theory of “the uncanny” in relation to the uncertainty students experience when learning in virtual worlds. Adopting a virtual ethnography (a research methodology developed by Hine, 2000 to examine the ethnography of, in and through the virtual), Bayne uses data gathered from mature postgraduates, considered as relative newcomers to virtual worlds. Drawing on both Royle’s (2003) account of the uncanny and Freud’s (1919) essay on the theme, Bayne suggests that there are connections between the uncanny and intellectual uncertainty, through students’ depictions of their learner experiences, suggesting that learning in virtual worlds can prompt ontological shifts about the self and world view and what it means to learn through engagement with
troublesomeness (Perkins, 2006; Meyer & Land, 2005a, 2005b). What she seems to
mean here is that Second Life prompts the blurring of boundaries between what is
real and what is fantasy, and can be compared to students coming to terms with how
intellectual uncertainty is integral to being a student in higher education. Indeed,
Bayne suggests that Second Life and other virtual worlds may provide a space
where a positive “pedagogy of uncertainty” (Barnett, 2007, p. 137) may be explored.
The role of an avatar and its interaction with the “real person” is also discussed.
Students can experience varying levels of immersion through their avatar and the
impact that language, silence and space can have on users interacting in virtual
spaces. Bayne goes on to suggest that the uncertainty of interacting with others in
virtual worlds creates opportunities to explore identity, including its disorientating
effects. However, whilst some students may find the experience exhilarating, for
others it can be “deeply disturbing”. Bayne goes on to acknowledge the intellectual
She suggests:

The ontological uncertainty foregrounded in the student accounts given here perhaps simply
indicates that Second Life and other virtual worlds materialise this uncertainty in new
ways—they defamiliarise our sense of selfhood and our mode of being together within the
pedagogical context, and in doing so ask us to reflect on it afresh as teachers and learners.
(Bayne, 2008, p. 203)

Bayne concludes by suggesting that for certain students, in certain contexts,
(she does not state who or where) learning in virtual worlds can provide rich
understandings of being in a digital age, with all the openness, unpredictability and
daring that digital ways of being can invite.

**Learning Collaboratively**

Active Worlds, a visually rich, user-extensible 3-D virtual environment, is the focus
of Dickey’s (2005) study, our third selected paper. Two case studies are presented
which use Active Worlds to foster collaborative learning amongst spatially distant
learners. Themes drawn from this study focus on the resources for distance learners,
which were designed through the use of an intuitive user interface, with roads
and paths providing navigational routes through course content. Although student
narratives are not presented, nor was it possible to track individuals’ specific
actions, due to the anonymity offered as students tried out the various Active World
tools, what Dickey reports is that *most* students were seemingly impressed by
the environment and the sense of learner embodiment experienced. Furthermore,
attrition rates on the course dropped significantly. It would appear this was partly
due to the real-time communication and visual environment offered. Active Worlds
enabled a group of distant learners to try out new roles, share multiple perspectives
and engage in activities which would not otherwise be possible. Student anonymity
necessitated trust and accountability for and with one another. In addition, the virtual
world provided both the academics and students the availability to construct their learning environment, using materials, models and tools in creative ways, providing “multiple means of representation and interaction” (Dickey, 2005, p. 449).

In the second case study, Active Worlds provides a synchronous in-world learning environment for a 3D object modelling course. Using text chat, the tutor was able to present concepts illustrated by sharing sample 3D objects of her own creation. Through their avatars, the students were able to locate themselves in specific positions to appreciate the design objects. Drawing on the use of authentic contexts and situated learning (Brown, Collins, & Duguid, 1996), access to expert modelling (Brown et al., 1996), the benefits of mentoring (McLellan, 1996), and the sharing of perspectives (Brown et al., 1996), Dickey highlights how the students were offered a rich learning environment in order to problem-solve and develop skills for their discipline from a first person perspective. Similar to the study by Jarmon et al. (2009), the virtual environment provided an opportunity for collaborative and cooperative learning and was seen to be valued by the way in which students engaged with the course. Such findings have implications for the design and increasing use of approaches such as problem-based learning in virtual worlds, which are used in a range of disciplines such as palliative care nursing and engineering (Miles, Savin-Baden, Tombs, & Milecka, 2012; Savin-Baden, Tombs, & Tombs, 2011).

**Trajectories of Participation**

Themes relating to virtual world learning in the final selected paper explore how people learn from play (Oliver & Carr, 2009). Whilst the paper from Jarmon et al. (2009) considered earlier extols the benefits of play in terms of enlivening learning contexts, Oliver and Carr question the notion of play through exploring the use of games and learning, especially with regard to how trajectories of participation can be used to inform pedagogy. This study explores the experiences of couples that play World of Warcraft (WoW) together. The findings reveal the potential problems students may face which need to be considered when designing ways to use virtual worlds for formal education, especially when related to how people learn through play and the use of games specifically designed as curriculum resources. The key themes of participation and trajectories of participation emerged from the data. These were analysed in light of Wenger’s (1998) communities of practice and include a focus on participation and trajectories of participation. In examining such trajectories, Oliver and Carr developed analogies relating to the varying degrees of participation the couples demonstrated which led to them withdrawing or remaining committed to the WoW game. In particular, overcoming material and social tensions were significant: for example, negotiating out-of-game as well as in-game social patterns, managing other routine daily commitments, making and maintaining friendships with other players, turn taking between partners or the tension created in increasingly challenging and risky role playing aspects of the game or when one
partner stopped playing while the other continued. Those couples who persisted were able to negotiate and overcome material and social tensions, whereas those who struggled with work, family and study commitments did not. When considered in relation to students in formal education, the use of games in education was deemed problematic if students are not supported to reflect on their relevance. More recently, as highlighted by Olasina (Olasina, 2014, 2016), learner experiences may be enhanced when examination of cultures and intercultural relations in the contexts of gaming are recognized, enabling the potential for diverse cultural backgrounds and means of expression. In addition, students’ sense of identity along with that of their peers and tutors, is also of note when considering the social commitments demanded of certain games. Further, the social and material tensions related to learning reveal the challenge of managing competing demands, which has been seen in the research into learning games such as the Quest Atlantis Project (Barab et al., 2007) and the River City MUVE (Galas & Ketelhut, 2006).

Discussion

There is sometimes a misconception that research into situated and experiential learning in virtual worlds is very new. The field actually began to develop in the late 1990s (see, for example, Bares, Zettlemoyer, and Lester (1998) and has continued since then. However, in addition to a lack of clear educational policy, there remains a wide range of issues surrounding the use of virtual worlds for education. It is also important to put learning in virtual worlds in the context of their developing use generally. Statistics on VW usage worldwide suggest that there are now more than 2.6 billion VW user accounts, with the majority of those accounts being held by children between the ages of 10–15. The number of registered accounts in VWs used by adults, such as Second Life, doubled between 2011 and 2015, and (KZero, 2016) whilst it is true that the majority of users are not experiencing VWs for the purposes of education, but rather for social and entertainment purposes, it is also true that, as a form of communication and interaction, they are proving increasingly popular and are being widely used. This does not mean that they can or should be automatically adopted for educational purposes, but it does mean that future students will be increasingly familiar with this form of technology. Virtual world learning seems to offer opportunities to move away from scaffolding learning in higher education, since immersive learning spaces such as Second Life (SL) are universal, not bounded by time or geography, and in particular adopt different learning values from other learning spaces. In terms of future directions, one of the main changes in technology has been the ability to integrate virtual worlds and virtual learning environments. The ability to access full 3D environments through a standard web browser has become a reality. The emergence of HTML5/WebGL.¹

¹https://www.khronos.org/webgl/.
allows highly functional, full 3D worlds to be created in games engines (e.g. Unity\(^2\) and the Unreal engine\(^3\)) and displayed in a browser. These developments will have a major impact on eLearning by facilitating frictionless access to 3D environments. The virtual world can be rendered inside the browser/virtual learning environment without any additional configuration or setup overhead and this eliminates issues related to firewalls, client installation, plug-ins and updates and the need for two clients, namely virtual world client and web browser access.

**Conclusion**

Computers change not only what we do, but how we think about ourselves and the world. Such suggestions would seem to be exemplified in perspectives on and studies into virtual reality and immersion, and certainly Žižek (1999), in his deconstruction of the film *The Matrix*, suggests the possibility that the deletion of our digital identities could turn us into “non-persons”—but perhaps a more accurate idea would be one of becoming changelings, rather than deletions. However, what strikes us most of all is that whatever we have use of that can be adapted or adopted for higher education should be harnessed to improve student learning. For some, possibly many, virtual learning is now a norm, for others, it is something to ignore or abandon at all costs. Yet higher education is on the move, and virtual learning is something we need to take with us into this unknown future, whilst recognising that living at the interstices of learning and technology are important places to stand.

**References**


\(^2\)http://unity3d.com.

\(^3\)https://www.unrealengine.com/what-is-unreal-engine-4.


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