Rhetoric and reality: critical perspectives on education in a 3D virtual world

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The emergence of any new educational technology is often accompanied by inflated expectations about its potential for transforming pedagogical practice and improving student learning outcomes. A critique of the rhetoric accompanying the evolution of 3D virtual world education reveals a similar pattern, with the initial hype based more on rhetoric than research demonstrating the extent to which rhetoric matches reality. Addressed are the perceived gaps in the literature through a critique of the rhetoric evident throughout the evolution of the application of virtual worlds in education and the reality based on the reported experiences of experts in the field of educational technology, who are all members of the Australian and New Zealand Virtual Worlds Working Group. The experiences reported highlight a range of effective virtual world collaborative and communicative teaching experiences conducted in members' institutions. Perspectives vary from those whose reality is the actuation of the initial rhetoric in the early years of virtual world education, to those whose reality is fraught with challenges that belie the rhetoric. Although there are concerns over institutional resistance, restrictions, and outdated processes on the one-hand, and excitement over the rapid emergence of innovation on the other, the prevailing reality seems to be that virtual world education is both persistent and sustainable. Explored are critical perspectives on the rhetoric and reality on the educational uptake and use of virtual worlds in higher education, providing an overview of the current and future directions for learning in virtual worlds.

Keywords: 3D virtual worlds, Second *Life*, Gartner's Hype Cycle, reality

Introduction, background and context

The Australian and New Zealand Virtual Worlds Working Group was formed in 2009 with ten members as part of DEHub (a consortium of Australia and New Zealand's largest and leading distance education providers). Six months later, the group decided to expand and welcomed anyone from higher education institutions using virtual worlds to support research, teaching and learning in these two countries. Today, the number of members remains steady at around 200. Since 2010, members of the VWWG have been writing joint papers to inform the wider community in relation to initiatives using 3D virtual worlds in education (herein referred to as virtual worlds). This year, members of the VWWG reflect on the evolution of virtual worlds and provide a critique of the rhetoric and reality of the impact of the application of virtual worlds in learning and teaching. Members of the VWWG were asked about their perspectives on virtual worlds in education and themes of emerging technology practices, using virtual worlds.

Literature review

The New Media Consortium (NMC) Horizon Project (New Media Consortium, 2007) has been documenting the trends in the use of emerging technologies for teaching, learning, and research in its annual reports since first published in 2002 and more recently, NMC's region specific technology outlook reports. Virtual worlds were first mentioned in the Horizon Report in 2007, which identified virtual worlds as one of the six 'technologies to watch' and likely to have a large impact on teaching, learning or creative expression in higher education within two to three years (New Media Consortium, 2007). In the following year, the NMC's Horizon Report Australia-New Zealand (ANZ) edition again listed virtual worlds and other immersive digital environments as likely to have a significant impact on college and university campuses in one year or less, and reported that:

> The use of virtual worlds and other sorts of immersive digital environments in education has skyrocketed in the last few years. Hundreds of colleges and universities worldwide are using these spaces for all manner of projects. A continuing stream of new developments in the platforms and their underlying technologies promise to keep this an exciting, innovative space for some time to come (Johnson, Levine & Smith, 2008, p. 4).

Indeed, in 2007 and 2008, the NMC published summaries of surveys, which gathered information on the activities, attitudes and interests of educators active in the *Second Life* virtual world (New Media Consortium, 2007b; New Media Consortium, 2008). These and similar projections by commentators painted a promising future for the use of virtual worlds in higher education (Boulos, Hetherington & Wheeler, 2007). In 2007, claims were made by IT research and advisory company Gartner, that "by the end of 2011, 80 per cent of active Internet users … will have a 'second life', but not necessarily in *Second Life*" (Pettey, 2007, online). At the end of 2011, there were approximately 1.7 billion registered virtual world accounts (KZero, 2012) and 2 billion active Internet users worldwide. In 2014, there are approximately 2.8 billion registered virtual world accounts and almost 3 billion Internet users (ITU, 2014). Even taking into account that many virtual world users are likely to have more than one account in more than one virtual world, these figures demonstrate that Gartner's prediction in 2007 was reasonably accurate and undoubtedly shows an increase in the number of virtual world users between 2007 and 2014.

In 2007, of the 202 educators active in Second Life surveyed by NMC, 24% reported that they believed that Second Life would be the future of the web (New Media Consortium, 2007b). This rose to a more optimistic 47% of 356 educators surveyed in 2008 (New Media Consortium, 2008). By contrast, 12% in 2007 thought that Second Life offered great potential at the time of the survey, but would not be around in five years (New Media Consortium, 2007b), a figure that had fallen to 8% the following year (New Media Consortium, 2008). It is also worth noting that none of the Horizon reports from 2009 onwards referred to virtual worlds, while technologies such as mobile learning continued to appear in the reports from 2009 through to 2014. Similar trends are evident in the NMC ANZ specific reports, which were published alongside the global reports from 2010 onwards. One might reasonably argue that from 2009 virtual world technologies were no longer listed in the reports as they had moved beyond being 'on the horizon' technologies. Yet, the uptake in 2009 and 2010 did not reflect widespread adoption. Despite the increases in confidence expressed by educators active in Second Life over this short period, it is clear that in the studies carried out to date, the majority continued to be unconvinced that virtual worlds would gain widespread long-term use. It remains to be seen whether these predictions match current attitudes and practice. A more conservative view that there would be some great projects in Second Life, but would still not go mainstream was expressed by 26% of the respondents in 2007 (New Media Consortium, 2007b) and 23% in 2008 (New Media Consortium, 2008) surveys. Now, more than five years on from these publications, it is timely to ask whether the reality has matched the rhetoric or whether time has told a different

story.

Virtual worlds today

Some educators today are of the opinion that virtual worlds are losing their momentum and will barely exist in the near future. Yet others are as enthusiastic about their future now as they have been in the past. It appears that all is not lost for education in virtual worlds (Gregory, Scutter, Jacka, McDonald, Farley & Newman, in press); the demand for virtual worlds has shown a steady increase with active users increasing multifold from 136 million users in 2009 to 2.8 billion in 2014 (KZero Worldswide, 2014).

In the information and communication technology (ICT) industry with steady growth (see, for example, the Australian Computer Society (ACS) 2013 report) is it reasonable to anticipate rapid growth and development in virtual worlds. Developers of virtual worlds are attempting to create the most immersive, authentic, realistic and widely appealing virtual world, with many new virtual worlds emerging. Linden Labs, the creators of *Second Life*, have just announced that they will be creating a new virtual world in which users will be able to "create anything they can imagine" through an open world (Korolov, 2014a, online). In an article just two days later, Korolov (2014b) announced that yet another virtual reality startup will create a virtual world consisting of clones of cities across the world where there are humanoids that are replicas of a 'real' people instead of avatar personae. *ReactionGrid* has recently moved away from its *OpenSim* activity to develop *Jibe*, a virtual world that increases compatibility across platforms by using browser-based access by capitalising services from Vivvox for voice communication (Korolov, 2014d). The *ReactionGrid* team is also working on mobile compatibility to provide a take-anywhere virtual world experience.

Shuster (2013) has stated that online learning is the hallmark of modern times and argues "education is in the midst of one of the most radical transformations in its history" (Shuster, in press). High-end virtual worlds offer some distinct affordances over 'real world' classroom experiences such as providing simulated immersive experiences enabling students to walk through a historical battlefield, taking part in political rallies, or applying formulas and algorithms to simulate 'real world' situations (Shuster, 2013). These experiences are supported through the use of voice, video, presentations, unlimited class sizes and/or a variety of immersive and collaborative virtual world resources (Shuster, 2013). de Freitas (2014) also predicts that the use of computer generated environments in education will transform education and create more immersive and interactive modes of learning. In the past, many virtual world companies adjusted their virtual world to suit the needs of the consumers. This has meant that the types of virtual worlds currently in use are limited by the availability and support of the technology used to access the virtual worlds, and importantly, the user uptake. Conversely, the resources in terms of technology access, speed and graphics capabilities available today (for the home consumer as well as in education and industry) have improved dramatically since virtual worlds emerged (Koomey, 2012). These technological advances herald new directions and possibilities. The virtual world of the future will undoubtedly be very different from the ones experienced so far.

One example of the technology that could influence the future of virtual worlds is the Oculus Rift virtual reality headset, which made its debut with virtual worlds in 2012 (Welsh, 2012). When Facebook bought OculusVR (manufacturers of Oculus Rift) in 2014, virtual world creators were encouraged to ensure that their virtual world worked seamlessly with this new immersive and authentic technology. The purchase by Facebook has not deterred developers and users from ensuring that their environment integrates well with the Oculus Rift, to the point that some new worlds are being created to specifically cater for this new technology (Korolov, 2014a). Another example is the integration of virtual worlds with web browsers. One of Virtual World Web's first projects, a virtual world available through an Internet browser, was transforming Virtual Harlem from a digital replication of 1920s Harlem in Second Life to a 3D interactive space accessible via a web browser (Ballard, 2013).

As more educators have attempted to utilise virtual worlds in their teaching and learning environments, research has been disseminated and utilised to further enhance the integration of virtual worlds in education. Educators have looked to a variety of virtual world platforms as each has presented barriers to implementation within individual contexts and institutions. Meanwhile the separation between the virtual and 'real' is slowly dissolving. PixieViewer (http://pixieviewer.com/) has spearheaded the development of browser-based virtual world viewers and has demonstrated how artefacts constructed within a virtual world can be actualised through 3D printing technology. *Second Life's* support for Oculus Rift through the provision of access to their virtual environment is opening up new possibilities for immersive experiences. Likewise, the recent announcement from Mozilla Firefox (Vukicevic, 2014) that it will be adding native support for virtual reality devices to experimental builds of the browser suggests that such experiences could become ubiquitous. Augmented reality

is also offering potential opportunities. Metaio has recently launched its 6D holodeck technology which "places virtual environments directly in the real world.... Once the virtual environment is attached to the 'real world', the user can move and navigate in and around the virtual area as if it were there in real life, needing only the camera of their smart device" (Korolov, 2014c, online).

In addition to the announced developments in 3D virtual worlds outlined, education is also likely to make better use of 3D printing, an area closely aligned with 3D virtual worlds. In July 2014, Tinkerine announced the Tinkerine U project (www.tinkerineu.com), which aims to make 3D printing available in every school across North America. Although virtual worlds may be used for studying architecture and history through immersion in distant, conceptual, or even long-gone landscapes, 3D printing may enable students to print replicas of historical artefacts for further examination, or prototypes of designs in architecture, engineering, or automotive manufacturing. Virtual worlds have been found to be valuable tools for creating simulated environments for students to experience the high pressure, high-risk environments of the emergency room, operating theatre, laboratory, or high-end restaurant before a placement experience. 3D printing may also provide further opportunities to print out models of cells, viruses and other biological artefacts for hands-on study in a way not normally accessible, or unique molds for food products, adding creativity to the process (Lutz & Brannock, 2014). As 3D printing develops and becomes more widespread in classroom use, the ways in which technologies can provide immersive sensory experiences, including the tactile, will increase. There remains a myriad of opportunities for the combination of virtual worlds, virtual reality, and 3D printing in educational – and other – settings, yet to be explored. This is a particularly promising avenue for future development, as a lack of tactile experience is one element of 3D virtual worlds currently open to criticism, and the use of virtual reality and 3D printing in tandem may provide a powerful educational experience.

Rhetoric and reality of education in a virtual world

In terms of the initial hype that surrounded virtual worlds, the reality has turned out to be vastly different from the early predictions of the growth and uptake of virtual worlds. However, from the perspective of the Gartner Hype Cycle (Fenn, 1999) this difference can be put in perspective. It is not a phenomenon unique to virtual worlds. As seems to be common in the world of digital gaming (and indeed technology as a whole) extreme hype in the early phases of the development of a new technology or new use of an existing technology creates a false sense of expectation. Ultimately, when the hype dies down, the realisation that there is a gap between the hyper-rhetoric and reality emerges. However after the 'trough of disillusionment' comes the 'mature' phase of a technology's development and use when things move at a more sedate pace. Virtual worlds may be seen to now be in this phase where the hype has gone, the 'trough of disillusionment' has passed and what is left is much smaller scale, but steady and practical development of the technology and associated pedagogy. The gap between rhetoric and reality in this phase is reduced because expectations are more realistic (those that have persisted have much more experience now), credible uses of the technology for teaching and learning have and are continuing to emerge, and an increasing body of serious research is helping to review the path already travelled and lay out the path ahead. Another factor that has and will continue to have an impact on the use of virtual worlds in education is, in one sense, the unrelated technical development that has been going on in the background in relation to virtual worlds (and indeed in relation to commercial 3D digital games and MMOs in general). Things that were previously impossible or difficult to achieve are becoming more common fare (e.g. a web page displayed on a primitive object within the virtual world) or are not far off in the future (e.g. facial expression mirroring), and the performance and reliability of the various virtual world platforms is constantly improving. The pace of development is much slower than in the hype phase of the Gartner Hype Cycle, but the technology itself and its uses in education are becoming more stable. This new direction of development will require renewed resources and development. Much of the hard work in design has been undertaken by the vendors such as Linden Labs and *ReactionGrid*, but it is up to educators to apply the technology in appropriate ways within the curriculum. The specific discipline of game design and research will be of great importance to the community of educators who continue using virtual worlds (Eladhari & Ollila, 2012), as another source of evidence to help inform their own application in educational settings.

The preceding discussion highlights the evolution of virtual worlds and foreshadows their future potential in higher education. There is little doubt that the technological advances in recent years combined with the blending of virtual worlds with the 'real' afford enormous possibilities for education in the future. However, as is the case with many technological innovations (Conole & Dyke, 2004), in the early days of virtual worlds there was more rhetoric than research on virtual world education. Virtual worlds were seen by some as the golden grail of education. They were toted to be 'magic places' where the best of all educational practices could be utilised and many educators viewed them as the panacea for the challenges of distance and online learning (Stevens, Kruck, Hawkins & Baker, 2010). They were regarded as offering the possibility of alleviating the

tyranny of distance for geographically dispersed students, they could overcome the isolation of distance students and those with disabilities unable to attend classes on campus (Wood, 2010), and they could provide environments that were difficult or expensive to create in the 'real world' (Farley, 2014; Smith-Robbins, 2011). Early use of virtual worlds in education aimed to replicate many existing educational and communication practices, offering to replace many physical environments (Savin-Baden, 2010), but as other online educational and communication services (such as virtual conferencing) became widely available and increased in their effectiveness, the perceived advantages of virtual worlds lessened. Renewed interest in the use of online computer games and gamification in education is more focused on the users of these environments for student learning, and without the more general applications of the spaces for marketing and communications.

All of these advantages of virtual worlds remain true as evidenced by the many innovative applications of the use of virtual worlds for educational purposes. For example, virtual worlds are used to effectively and cost-efficiently produce machinima (in-world video productions), and to create engaging simulations and challenging gameplay activities (for example see Reardon-Smith, Farley, Cliffe, Mushtaq, Stone, Doyle & Lindesay, 2014). As well, there are as those who have constructed elaborate builds to enable learners to immerse themselves in authentic experiences not otherwise available in the 'real' world for reasons of cost and/or practicality. Nevertheless, as Farley (2014) argues, there are comparatively few academics actually using virtual worlds in a way that leverages the unique affordances of these environments. The reality has not quite lived up to the hype, but for those still working with virtual worlds, the effectiveness of the environment is undeniable. Virtual worlds do provide possibilities unavailable or impossible in the reality of the traditional classroom. Much of the initial rhetoric on virtual worlds is, in fact, the reality in virtual worlds. Evidence suggests that students are engaged and motivated (Butler, 2012; Campbell, 2009; Gregory, 2012). They learn and learn effectively. However, the reality is that good teaching practice must underpin activities in virtual worlds just as they do in the 'real' world. Some studies revealed issues with learning transfer in virtual worlds. For example, de Freitas et al. (2010) observed that some gamers found negative learning transfer in learning activities in *Second Life*. The importance of learning design and the alignment between learning outcomes and activities in virtual worlds is essential.

Although research has identified several factors contributing to the slow uptake and effective use of information and communication technologies (ICTs) for more than a decade (Conole & Dyke, 2004) the continuing lack of understanding of how to utilise these technologies to support authentic virtual learning experiences has continued. As Conole and Dyke (2004, p. 115) argued 10 years ago, the application of ICTs in education "is often based on common sense rather informed by pedagogical theory". In response to this challenge, they advocated for the development of a taxonomy of the affordances of ICTs which could inform the appropriate use of technologies and support teaching and learning. More specifically in relation to virtual worlds, Savin-Baden, Gourlay, Steils, Tombs & Mawer (2010) argue that the uncertainty over the pedagogical value of their educational use has limited their uptake in higher education and that there is a need for educators to move beyond the social affordances of virtual worlds to explore their pedagogical potential. The affordances these authors refer to are the perceived and actual properties of the technology that determine how that technology can be used for learning (Salomon, 1997, p. 51). Savin-Baden et al. (2010) describe three such affordances of virtual worlds: 1) scenarios, simulations and role-plays; 2) teamwork or team-building enhanced through the sense of presence and co-presence created by avatar representations of students; and 3) as the focus of the activity (for example programing, 3D construction or modelling). Dalgarno and Lee's (2010) framework for matching the affordance requirements of learning tasks with the affordances of virtual worlds identify five primary affordances of the educational use of virtual worlds. These affordances include: 1) enhancing spatial knowledge representation of the explored domain; 2) enabling experiential learning activities that would be impractical or impossible to undertake in the 'real world'; 3) facilitating intrinsically motivating learning tasks; 4) providing learning opportunities that support the transfer of knowledge and skills to 'real' situations through contextualisation of learning; and 5) facilitating rich and effective collaborative learning tasks. As Wood (in press) argues, virtual worlds when applied in ways that maximise their affordances, can support collaborative, intrinsically motivating, authentic learning activities and also facilitate the transfer of knowledge from the virtual world environment to 'real' situations.

The following sections report on a study which sought to identify how members of the VWWG currently use virtual worlds, the perceived pedagogical benefits and the challenges they have encountered. Findings from these kinds of studies can help to inform educators about the affordances of virtual worlds and to understand the barriers that may be limiting the wider uptake and effective use of virtual worlds in higher education.

Methodology

Members of the VWWG were asked a series of questions in relation to research, teaching and learning through the use of a virtual world. Questions related to what virtual worlds they are using in their institution and how, the number of staff and students involved, the disciplinary context, challenges of using virtual worlds, perceived trends, how virtual worlds were used in simulation, collaboration, communication, engagement, and the stepping-stones that they have had to overcome. They were also asked to comment on the rhetoric and reality of education in a virtual world. The following section provides an overview of the analysis of these questions.

Analysis

Members of the VWWG reported that they used a range of virtual worlds, and that some use more than one. An 85% majority of respondents still use the *Second Life* virtual world as a teaching, learning and research tool. The majority of the remainder were using *OpenSim.* Others use platforms that incorporate, to different degrees, elements of virtual worlds, gaming, gamification and 3D world building such as *Minecraft*, *Kitely*, *Active Worlds*, *ReactionGrid*, *Jibe*, *World of Warcraft*, *Sim-on-a-Stick* and customised virtual worlds. Members of the VWWG reported a wide variety of disciplines in which these virtual worlds were employed for educational purposes as seen in Figure 1.

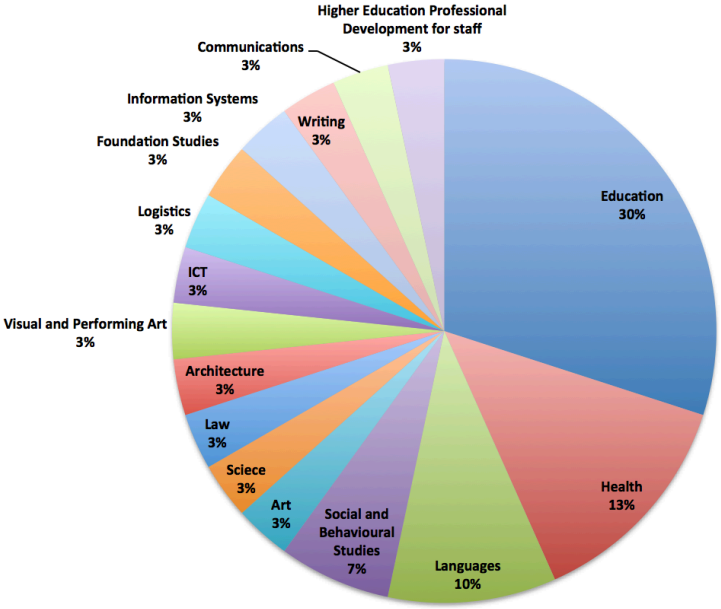

Figure 1: Breakdown of VWWG members' use of virtual worlds by discipline

Members of the VWWG reported that virtual worlds are being used for a wide variety of uses involving both synchronous and asynchronous learning (see Table 1). Virtual worlds can be collaborative, motivating and provide authentic learning experiences where knowledge can be transferred from virtual to 'real' situations (Savin-Baden et al, 2010). Other studies have shown how immersive experiences in virtual worlds can be designed from a more pedagogical perspective (e.g. de Freitas et al., 2010). Similarly, Dalgarno and Lee's (2010) taxonomy identifies several affordances of the educational use of virtual worlds. These affordances include the collaborative benefits of their role in providing experiential (actual or simulated) learning activities that would be impractical or impossible to undertake in the 'real world', and providing learning opportunities that support the transfer of knowledge and skills to 'real' situations through contextualisation of learning within a rich and intrinsically motivating environment. Table 1 categorises the types of activities members of the VWWG reported that they are undertaking in virtual worlds to support their teaching and learning in ways that draw on the kinds of affordances identified by Savin-Baden et al. (2010) and Dalgarno and Lee (2010).

Table 1: Communicative and collaborative experiences: virtual world activities

Role-play and simulations • virtual role-play • transformative learning • language learning • collaborative learning • authentic simulations • trialling performances and investigating what others are doing in virtual worlds • virtual role play to enhance communication skills • hands on use of meaningful communication in a simulated environment with real life-like scenarios • prototyping of scenarios	**Academic research and administration** • research in the use of virtual and gaming worlds with the theory of secondary world development to support engagement and cognitive transfer • researching the ability of virtual world activities to facilitate transfer in learning • virtual depository • researching global community development through virtual worlds	**Educational professional development** • professional development via communities of practice • teaching and learning studies • explaining the benefits of using virtual worlds in education • introducing staff to the potential of virtual worlds • demonstrating virtual worlds as an educational tool for would be teachers
Orientation • familiarisation sessions for students • student orientation to a 'real word' environment	**Assessment** • public e-assessment examples • conceptual design for how can virtual worlds be used for assessment in off-line situations, for example, e-assessment	**Resource development and sharing** • upload information for students to access specialised scenarios • making machinima
Improving access • running international challenges • organising events for people/students with disabilities and those who experience chronic illness • in world discussion sessions and guest speakers • attending meetings	**Self-directed study** • learner perceptions in using virtual worlds as a self-study tool • Enabling students to take responsibility for own learning in the world by motivating them to explore virtual organisations	**Improving engagement** • teaching professional and creative writing through storytelling • engaging students in skills and outputs rather than marks and tasks • providing motivating, engaging, and challenging activities for students

The initiatives reported by VWWG members who are using virtual worlds in their learning and teaching have been designed to achieve a range of outcomes. Some of the purposes for their educational use of virtual worlds identified by respondents include the use machinima:

- to simulate situations paralleling those which students may encounter in real world practice. In tutorial or workshop discussions, students may role-play as characters in the simulations to resolve the various issues (e.g. as a judge making rulings of law in simulated court proceedings, or as a senior partner in a law firm providing advice to a more junior employee on an ethical matter that has been encountered);
- to provide a background narrative that establishes relationships between various characters and imparts important information which is needed by students to undertake an activity such as completing a written assignment or participating in class discussions or activities;
- as a means of depicting scenarios in order to help students to relate in a way not possible if the scenarios were only described in text (Butler, 2012); and
- providing multiple perspectives by having students to assume different roles/avatars in role-play simulation thereby enabling students to develop empathy

Members of the VWWG were also asked to report on their perceptions of using a virtual world for research, teaching and learning. Some members reported that they believe there is a lack of progress towards making virtual worlds useable for the 'average' academic and non-specialist education designer. They suggested that usability could be improved by making available 'easy to use' development kits, tool sets and plug-and-play/reusable components. This may align with broader movements towards open educational resources and open or 'free' software aimed at furthering education and computing via the sharing of resources. Respondents also reported that if they were more informed about the interface, which some respondents suggested has been designed primarily for the ease of use of those familiar with games devices, they would be able to focus on the tasks associated with their use as opposed to a preoccupation with the basic functions and burden of operations. This would also enable students to focus on their interactions in the virtual world and maintain intrinsic motivation 'in the flow' (Csikszentmihalyi, 1996), while also facilitating use of such a virtual environment in an

ad hoc fashion. The respondents reported that they perceived this 'burden' of 'suffering' the hurdles of using virtual worlds needs to be removed from teaching staff whose primary focus is on using such environments for research, teaching and learning.

Challenges

Outside of the formal educational setting, students have access to high quality games, which incorporate high levels of interactivity and a multitude of pathways and levels of difficulty. However, although these environments are expensive to produce, the initial investment can be justified by profits gained from commercial markets. One of the challenges is how educational virtual worlds and similar platforms can compete with such commercial products and still produce the desired learning outcomes for students. There has to be a good return on investment or cost saving to produce game quality resources. They need to be easy to update and to link with other new and emerging technologies. Perhaps the recent developments reported on in this paper may go some way to address these issues.

Another challenge reported by VWWG members is that most educators start from scratch with low-level use of the environment rather than building on the work of other educators. Moreover, institutional level support can often be lacking or absent causing a paucity of available resources (Dalgarno, Gregory, Carlson, Lee, & Tynan, 2013; Newman, Farley, Gregory, Jacka, Scutter & McDonald, 2013). Digital assets are created, used, and then disappear based on available funding and activity. Every new venture must start again. Universities could use a build that someone else has created, pool resources with another to maximise the impact, or take what someone else has done and progress it. This very rarely happens. The ability of the software to enable data backups and the ease of sharing of digital assets needs to be addressed in order to help educators to repurpose those assets and resources.

The perceptions of members of the VWWG are that reactions often heard from non-virtual worlds users are generally negative. The perception is more a case of 'why would you bother' or 'is *Second Life* still going?' than any sense of excitement about the potential, such as access to a global audience, the possibility of teaching/researching from home, or the potential for virtual worlds to be an effective learning environment. The rhetoric is that with the ever-increasing activities occurring in virtual worlds, the relevance of using virtual worlds in educational contexts will inevitably become greater.

Virtual worlds have promised much and have the potential to deliver on these promises with appropriate pedagogical use of the technology in ways that maximise the affordances, but at the same time, the focus has not been in a 'whole of system' approach. The hype has not always been matched by reality. As the VWWG members report, the challenges in successful implementation of virtual worlds in education is much more complex and difficult to achieve and sustain than previously imagined. The idea that we can readily offer virtual world tools to academics and achieve the required pedagogical transformation required to engage students and improve learning outcomes has failed. The dedicated, skilled and/or funded few have successes in places. However, the wide range of experimentation conducted in earlier years, while worthwhile, has resulted in a great deal of knowledge, but little sustainable activity. We need to take the next step, to embark on an extensive, systemic evaluation of the 'life cycle' (or 'life system') of virtual world utilisation in education, to articulate the requirements for an effective, sustainable virtual world implementation. This includes guidelines on how to best employ virtual world technology (i.e. where it can do things that other technology cannot), resourcing requirements, professional development/skills requirements, and development of easy to use building tools, along with 'virtual world class room in a box' type availability. Until the tools for constructing a usable and useful virtual world space become as easy to use as a word processor, then many academics will be left out and hopes for virtual worlds to be accepted as mainstream educational technologies will fade.

The hype surrounding virtual worlds in the early years has rarely translated into actionable knowledge in reality. As noted from this study, the mismatch between rhetoric and reality is due to several factors including limited usability, complexity and inappropriate applications of virtual worlds that fail to maximise their affordances. Initial experiments into the use of virtual worlds in teaching and learning came from a fascination with the possibilities of using converged moving image, avatar, voice and text communication within a space that universities could all contribute to building for future generations to use, add to and learn from. In practice, however, focus has shifted away from virtual worlds because a major shift in institutional priorities towards 'non-situated' learning through cloud technologies. This has required the development of a completely different skill set to develop cloud concepts and the use of text material and activities that are accessible regardless of any student's or staff member's location. Regrettably, virtual worlds as they are currently developed are not amenable to access on mobile devices. This will change as the technology develops, so the expectation is a

renewed emphasis on this space.

The time and effort required to undertake self-initiated training within a virtual world infrastructure has been difficult for most academics. This, too, is regrettable because the very ideas linked to cloud learning are inextricably tied to the way in which text information can be adapted for presentation in virtual worlds. Finding the time and wherewithal to pursue these objectives through research then informed curriculum design and targeted interactive/immersive activities, is invariably difficult when other priorities and skill sets need to be developed to meet the changing requirements of online educational delivery.

Conclusions

The review of the uptake of virtual worlds in education and the findings reported in this study suggest that the initial promise that virtual worlds would emerge as mainstream technologies for widespread adoption in higher education has not yet been realised. Although disappointing for those who anxiously await a readily available, inexpensive, easy-to-use virtual world platform, for others closer to its development such as those whose innovative use of virtual worlds in their learning and teaching activities are reported in this paper, there remains enthusiasm and a strong sense of impending achievement. It appears that neither the initial hype, nor the more negative rhetoric, in relation to virtual worlds, paints the entire picture. Diverse practice and perceptions exist among virtual world practitioners themselves. However, we see the use of the virtual world in a range of contexts, let alone that of learning, is steadily but surely sliding away from the Gartner Hype Cycle's 'Trough of Disillusionment' and on up the 'Slope of Enlightenment' curve towards the 'Plateau of Productivity'.

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