

Distance Learning Technology, Current Instruction, and the Future of Education: Applications of Today, Practices of Tomorrow

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Chapter 15

Alternative Realities: Immersive Learning for and with Students

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ABSTRACT

As students increasingly engage with alternative social networking (or realities) there is a scope for educators to explore whether they pose opportunities for rethinking learning and teaching spaces. The authors argue that there is a requirement to shift away from mapping traditional thinking about what constitutes a learning experience when considering virtual worlds. This chapter draws upon two case studies that have provided two distinctly different learning designs for Logistics students and pre-service teachers. These cases, alongside a comprehensive review of the use of virtual worlds in education will draw out issues and factors which need to be considered when pursuing virtual worlds as learning spaces. Specifically, discussion and recommendations will have a focus on pedagogical, organisational, equity and access, cultural, economic and social factors relevant to the use of virtual worlds in distance education.

INTRODUCTION

Over the last years, the Web changed from a *producer-to-consumer* (Web 1.0) to a *consumer-are-producer* (Web 2.0) philosophy where the social networking became the fundamental concept for new services; see Facebook (2009), LinkedIn (2009) or YouTube (2009). Everyone is able to contribute – e.g. writing blogs, twitter or submit

new Wikipedia entries to a common knowledge base where information is shared rather than collected in decentralized databases for private usage. Collaboration is lived and information becomes a common good being organized by the crowd. One outcome of this era is the virtual worlds which combine most of the features of the Web 2.0 but within a 3-dimensional space, or as it is generally called, world. In this chapter, we take a look at virtual worlds but focus on learning and teaching in this environment as it provides new and chal-

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lenging opportunities to rethink the classroom and curriculum design, especially in a distance education context.

Despite critics, virtual worlds are emerging as a technology that cannot be ignored for their possibilities for distance education. This chapter has as a focus on two case studies that are drawn from two distinct disciplinary fields and from two distinctly different organisations. The University of New England is a large distance education university located in a regional setting on the Northern Tablelands of New South Wales, Australia. More than 80% of students are learning by distance and are considered to be off campus. The other, the University of Hamburg, is a large urban University located in Germany which has most of its students learning on-campus.

The authors from these varied contexts will illustrate and provide analysis of student experiences (both as on and off-campus students) of two different uses of virtual worlds. This is important for the substantive discussion of factors which may influence the adoption and success, or otherwise, of the use of virtual worlds as a learning and teaching space. Interview extracts with experts, lecturers and students, constitute further data for critical analysis and are included to show that the ‘feel’ of immersion is not bound to a physical real world but can be simulated and still result in a realistic purposeful learning experience. The interviews reveal learning and teaching requirements and expectations, which are discussed and reviewed alongside the literature and pedagogical models.

The authors are reporting on their experiences in the use of Second Life, a virtual world established by Linden Lab and acknowledges the range and diversity of alternative virtual realities available. They see that there is transferability of ideas and believe the use of one virtual reality over another may not necessarily impact on the ideas. The idea of virtual worlds or 3D-environments is demonstrated and used in many different

forms in the past. For example in movies like the Star Trek Next Generation-series, which used a Holodeck to project different (real) environments into a restricted space, or simulations for training dangerous situations. Nevertheless, the concept, functionality and design of Second Life can be tracked back to the novel “Snow Crash” (Stephenson, 1994), where people escape the real world (as opposed to virtual world) through a technological device into a Metaverse where they are represented by avatars which are virtual representations of themselves. The Second Life world consists of regions, so called islands with 65536 sqm each, which can be designed by their inhabitants without any limitation and used for all purposes like building new homes, businesses (N.N., 2008), educational institutions (SimTeach, 2008), recreation areas, museums (Second Life Wikia, 2008), historical places, governments and embassies like Sweden, Estonia or U.S., or fantasy locations; see also (Second Life Grid, 2008; Second Life Wiki, 2008; Tapley, 2007). The virtual world of Second Life that was used for these projects has been created by the users for the users (Linden Research, 2008b). As at November 2008 there were over 16 million registered users, in a one week period there were over 580,000 members logged in with approximately 60,000 users online at the one time. In relation to educational institutions using Second Life, there are variations with the literature:

- More than 250 universities were using Second Life as an educational tool (Calonge, 2007)
- Over 100 virtual lands currently being used by educational institutions around the world with the majority of University campuses based in the United States (Linden Research, 2007a)
- John Lester, the Academic Program Manger at Linden Lab, states “there are more like 1,000 educational institutions

using Second Life, although it is difficult to actually state accurately” (Conversation with Pathfinder Linden).

Tyke McMillan and Jass Easterman (the author’s teacher avatars: Torsten Reiners, Sue Gregory), who facilitate learning experiences within Second Life for students in Information Science (University of Hamburg) and Education (University of New England) for 18 months and 6 months respectively. Tyke and Jass have developed distinct learning strategies for their students that reflect the different disciplinary requirements.

This chapter proceeds to tell the stories of Tyke and Jass, explaining why Second Life was chosen by the two institutions and draws upon relevant literature. The following section presents a brief overview of virtual worlds and provides a basic background for the reader to follow the later scenarios. Section *Virtual worlds and mediating distance learning* introduces the main subject of the chapter by explaining distance learning using examples in Second Life in addition to the given definition in the beginning. The examples are followed by the main contribution, the outline of the two scenarios at the University of New England and University of Hamburg. For both examples, a short background as well as the course experiences are shown, including the current and future intention how to continue from the described outlines. The chapter continues with a discussion on important subjects to consider if being active in virtual worlds: pedagogy of using Second Life, the organisations involved, equity, access, cultural, economic and social issues of students. The paper concludes with an outlook and references.

DEFINING VIRTUAL WORLDS

There are over 70 virtual worlds currently being used by educational institutions around the world. However, the ongoing creation of new worlds for all genres and age groups this number will

no doubt increase (Johnson, 2008). Even though some have been available for over ten years, the more popular Second Life has only been available to the public since 2003. Compared to most other worlds, Second Life allows the highest degree of freedom such that members can principally inhabit and build their own 3D world (Linden Research, 2008b) and is therefore the choice of most universities (Jennings & Collins, 2008). Although the story of Second Life includes up and downs, its wide media coverage and discussion in all societies initiated a new era of social environments with a continuously growing number of new virtual worlds opening on a regular basis.

Before we continue, we should have a short discussion about how virtual worlds can be distinguished by their features and the kind of user community; see (Wikipedia, 2009) for a list of classification criteria as well as (Slater, 2004). The largest, and probably most successful kinds in terms of revenue, are the MMORPGs (Massively Multiplayer Online Role Player Game) with Worlds of Warcraft, Everquest, or Star Wars Galaxies. Variations depend on the focus, eg MMOFPS (first person shooter), MMOR (racing), or MMOSG (sports, strategy, social). Linden Lab argues that Second Life is similar to MMO with respect to display and interface and is generally seen as a MMOSG: Creativity, as everything is user generated, ownership, as everything is owned by the creator, fees, not for access but land, and unlimited choices how to behave, what to do and what to become; (Second Life FAQ, 2008). Further classifications are MUVE (*multi-user virtual environment*) and SCMUVE (*social and collaborative*) define the major components of Second Life and similar virtual worlds. Note that despite game-like immersion the term *game* is still not appropriate for SCMUVE due to several criteria like overall goal, bonus like character improvements and classification mechanisms for the main character are missing and there is no real competition in terms of high scores and rules. Virtual worlds might have “game-like immersion

and social media functionality”, they lack “game-like goals or rules” (Constable, 2007).

It appears that those aged around 20 are engaged with virtual worlds of various types. The classification by (KZERO, 2008) shows that there is a clear focus on age groups below 20 and focus around 20 for socialising and casual gaming. Collins (2008) supports this with statistics from Linden Lab where there is a dramatic increase in users in the 18-20 year age group using Second Life. Even current students in their mid twenties, and therewith in an age group with less interest in virtual worlds according to (KZERO, 2008), join projects in Second Life due to their experiences with social worlds (eg Habbo World, There, Active Worlds and others) or online gaming where they collaborate in teams to compete against other groups (eg, World of Warcraft, Star Wars, Maple Story). Being used to the 3rd dimension and the navigation/interaction through avatars helps them to focus on the exercise while being motivated through the *combination of learning and (private) entertaining* (Remark by Student, 2008). As discussed below, the technology is less a barrier than accelerator for students new to virtual worlds, especially as the projection on the avatar helps on the immersive atmosphere as well faster integration in the virtual team and the media (Lamont, 2007).

With respect to higher education, most of these worlds are of little interest to educators as they provide rather limited opportunities for integration in the curriculum. Nonetheless, the variety and the number of participants with up to 100 million (eg, Habbo World in 2008) requires observation and analysis of developments as the next generations, according to Prensky (2008) and Driver (2008), are engaging with technologies that could impact on how we go about facilitating learning. The next generation, the so-called *digital natives* (Prensky, 2001) are close to the age where they enter university programs. They have a high computer literacy (Myers, 1989) and expect the same from

their teachers. Therefore, it is important to understand the potential of the environments where the next student is self-confident and knows how to navigate and interact. The lecturer needs to take a step towards the students to pick them up for the next learning experience; either in the classroom or the virtual world. It is not important where but how and with what kind of existing knowledge, behaviour, and understanding for inclusion in the next classroom or even curriculum. Therefore, the lecturer has to learn now about virtual worlds.

Virtual Worlds and Mediating Distance Learning

Virtual world's can reduce the isolation that students feel when studying at a distance. It is possible for students in virtual world's to feel as if they are present in a real classroom talking to people as if they were actually standing next to them. In a virtual environment, the only thing students do not get if they were actually with someone are cues relating to body language, but most importantly facial expressions.

Distance learners often express loneliness and mostly choose to study this way due to obligations of work and family lives and would prefer regular face to face instruction (Ostlund, 2008). Students feel they miss collaboration and social activities with others. Distance education can be supported by many technologies, however, according to Belanger & Jordan (2000) some provide almost no interaction of communication between the learner and the instructor, and might even camouflage the size of lectures to the students. Communication technologies make it possible to store, transfer and share information across vast distances and different time zones. Students have the opportunity to engage and immerse in content through the use of a virtual environment (Marshall, 2008). Online communications reduce the distance between people. Online communications through virtual worlds incorporate text, voice and shared

experiences making communications much richer (NMC White Paper, 2007). Interactions happen more quickly than they might otherwise.

A rich and dynamic experience asks for a synchronous lecture with all participants being online at the same time period. This might not be given with respect to international classes and, therefore, numerous time zones. Virtual worlds also provide communication channels and documentation possibilities that improve the synchronous and asynchronous collaboration and teaching, whereas the focus in this chapter should be viewed as learning activities with all students being online at the same time and at the same location in the virtual world.

Over the years distance education has moved from print-based correspondence materials towards increased web mediated and frequently blended learning experiences. In addition, teachers have moved from delivering information with limited interaction to more social constructivist online interactive learning experiences. In contrast, virtual spaces offer distance education students alternative opportunities for collaboration with their peers, and immersion in rich, visually interactive and diverse learning experiences (Marshall, 2008), which are controllable, recordable and safe.

The learning experiences of our current generations of distance education students are varied with a range of hybrid and blended models being adopted. The prevalent online options are via use of Learning Management Systems serving up HTML-pages, (enhanced) pod- and vodcasts, wikis, blogs, and various Web 2.0 services (Gregory & Smith, 2008b). These options could be viewed as technology islands, providing multi-media learning cameos rather than complete and controlled and recordable experiences. While the mix of content and media allows students to see and hear their online materials (cognitive domain), it is more difficult for students to 'feel' (affective domain) and thereby achieve a balance of educational objectives. Virtual worlds can provide experi-

ences where students could *feel* like they are in a workshop, tour, or meeting without having to leave their home and thus, for many, mediate distance. There is already evidence to suggest that virtual simulations can create a 'sense' or 'feel' of what it would be like. Students have already indicated "this is great ... love the change almost like face to face with lecturer" (Gregory, 2008). Another student states "I know I keep saying it, but I am absolutely loving this course.:) And not just SL: the entire unit is so well presented - for instance, I have heard your voice! It helps avoid the feeling of isolation so many of us externals feel and the way in which the information is delivered makes it so easy to learn. Thanks!" (Gregory, 2008).

Furthermore, virtual worlds are increasingly being used for simulation (Ramondt, 2008; Addison & O'Hare, 2008; Ryan, 2008; Toro-Troconis et al., 2008), whereas we need to distinguish the one that is generally done in virtual worlds and the one being done with specialized software. The first one is generally running in real time, involves human interaction and does not guarantee 100% accuracy in terms of physical influences. Other simulation might be in real time, but involve large computational power to map all physical properties (wind channel), mechanical devices (flight simulator) and humans participating in the experiment (pilot). Furthermore, pure mathematical or process simulation can run faster to simulate large time frames as well as be repeated for different influence factors. An example where almost all technologies are used is in the area of racing. Racing drivers learn the track by playing console games, while the car is first tested in wind tunnels before driven on test tracks. Note, that especially simulation using realistic models require vast financial resources, whereas virtual worlds compensate this through simplification.

Just imagine an experience were students could feel like they are in a workshop, tour, meeting without having to leave their home. Imagine engaging in an activity where you are talking to someone, collaborating with that person to enhance

the learning experience, undertaking an activity that you just couldn't do because of distance, expense, time, danger or difficulty, from your own home. Imagine students becoming so immersed in the learning environment that they always want to attend and lose track of time. Imagine being able to hold a class where you could take into consideration anything that you desired: chemicals, building, tours, excursions, engineering, large construction, land transformation, intricate operations, patients available to demonstrate various medical procedures (Gregory & Smith, 2008a) and all students were totally engaged that they turned up for class, participate and have fun! These are all possible within a (social) virtual environment. According to (Barnes & Tynan, 2007) students would prefer to not attend lectures if there are alternative engaging online sources offered. However, some eLearning platforms are mostly text based, not interactive and made available without sufficient testing, whereas the alternatives are required to be interactive, motivating and pedagogically adequate (Darbyshire, 2005). Note that this observation might contradict with the idea of an ideal student who is attending the classroom session and participates in the activities. Unfortunately, attendance is not always possible due to manifold reasons: eg, illness, family, internship, or time to reach the classroom due to distance or means of transport. Second Life provides a means of education, particularly for those who wish to experience the feelings of 'being there' but aren't able to attend (distance students), and may be more engaging and interactive for the students as an alternative to lectures (internal students). Nevertheless, there are also students who would prefer to stay away from the classroom if there is an adequate choice (covering all learning materials including the parts from the lecture). This can be the comfort of home (learning on the couch while being online in video-conferences or being in a virtual world following the lecture on virtual slides) or, in case of recordings or instalments of learning units, the independence of time and place

of where, when and what to learn. In conclusion, virtual worlds are actually an advantage to reach out for students who would like to stay away from the classroom and still achieve a (virtual) social group or network of all participants. But it is also important that the lecturer is observing the learning progress of all students and intervenes in case of absence or little participation.

Cisco Systems Inc is a large hardware technology manufacture who train remote staff based in Asia pacific region (Collins, 2008) in Second Life. "The sale staff could be working from home but the virtual world enables individuals to see the hardware and the engineer walks them through the 3D hardware at the same time. What happens after the event is important. When finished, participants mingle with others in the audience, which is extremely powerful. Microsoft frequently holds conferences in Second Life, find it very cost effective and there is a lot of interaction after conference presentations". NASA has created an environment for astronauts to practice piloting rockets where atmospheric and other real life situations are incorporated into the training without the expense (Gregory & Smith, 2008b). These examples demonstrate how Second Life can be used as just a meeting place, a place to demonstrate experiments that are not possible, too expensive or dangerous to undertake in real life or to use as a training base, recreating real life and enabling people to come together that could not typically do so due to time, distance and cost constraints.

Charles Nesson from Harvard Law held mock trials in Second Life and found that the sessions ran smoothly through text chat because the participants were more concise with their arguments as opposed to session in a real classroom where the participants tended to speak too long (Constance, 2007). Zagami (2008) also found that the virtual world was an effective environment where students work collaboratively and produced more creative responses when working this way. The Australian newspaper conducted a study from

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2002 to 2007 tracking 250 graduate students taking 16 courses, some within the virtual world and some not. It concluded that students using the virtual world developed rapport and stayed interested longer and debated subjects more deeply (MCT, 2008). In Gee (2003), the influence of (serious) games is discussed, especially in identifying with the game character and using the virtual experience to become interested in the subject and doing additional reading in external material. The gaming environment incorporate components with relevance for real-world situation, where the cognitive learning process is embedded in highly motivational settings where the human and the fictional player *melt* as all interactions directly transfer to the game (Clark, 2003).

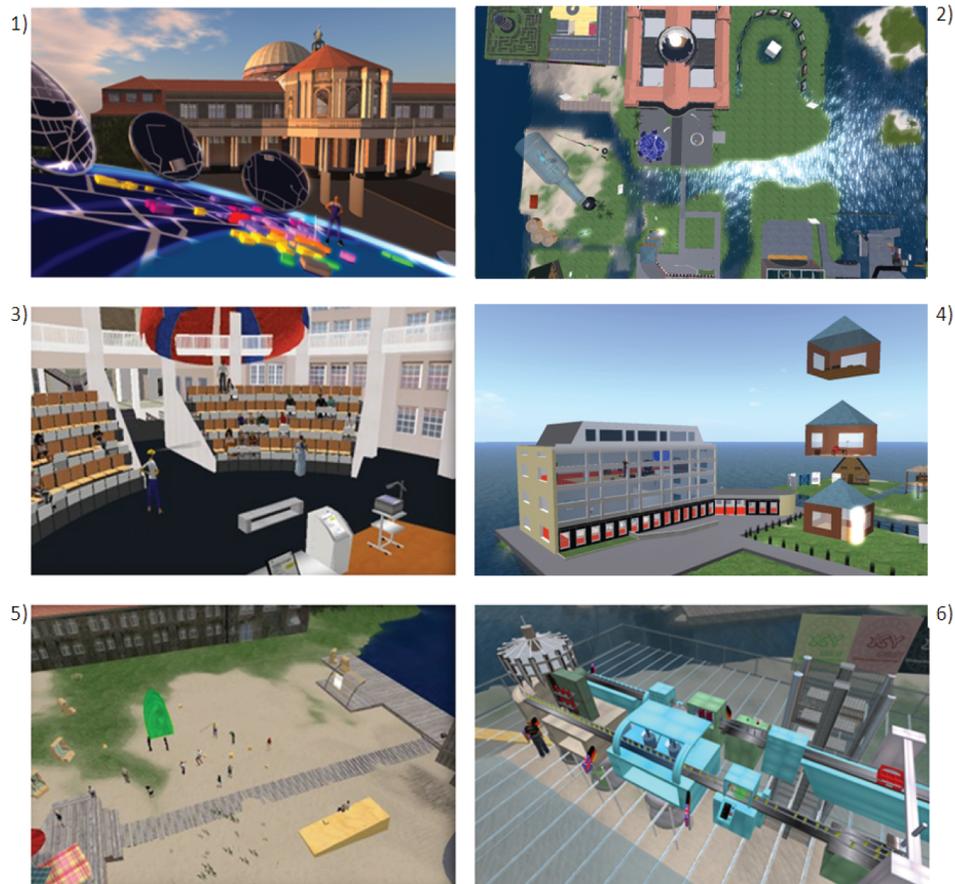
According to Ondrejka (2007) the features of Second Life enable the emergence of different approaches to education and engage traditional, large-scale educational institutions. He states that residents are approaching learning with a passion and excitement they may not have possessed in school. Bowers (2008) also states his studies supported the notion that educators would use a virtual world again to conduct their classes and its success was due to its immersive environment and the engagement of the users. Lagorio (2007) prefers classes to be discussions and “things pop up in a less linear fashion (in Second Life) than they do in a regular classroom”. She finds that students hold after-class discussions about their courses when in Second Life. Ball State University English studies offer students the option of using a virtual world for their learning environment (Robbins, 2007). At their last intake, Spring 2008, there were over 300 student applications and it has been found a very successful and popular environment for learning (Koch, 2007). Koch (2007) quotes Robbins, “in a 20 minute class there is about 20 pages of dialogue ... we have great discussions that extend beyond what we’d be able to do in a traditional classroom”. However, Brown & Bell (2004) disagree with this notion by stating that

the chat feature of a virtual world can often be out of sequence.

According to Robbins (2007), Second Life is being used in Higher Education in a variety of disciplines, almost any that one can think of. The environment has been established for those who wish to use it. All it requires is a clear understanding, structure and imagination as to how it will be utilised. Kovala (2008) states that the potential uses of a virtual world could include social interaction, collaboration, creative construction, raising awareness, information resource, data visualisation, simple simulation and a teaching and learning environment. When using a virtual world such as Second Life, the educator should have a clear idea of what they wish to achieve for their students, such as the learning outcomes of the course, to make the environment and activities within the environment more meaningful for their students.

To illustrate this independence of place in virtual worlds, we describe use-cases based on classes presented by Tyke and Jass respectively. However, before we describe the course outline in detail, we should have a look at the general classroom design as these demonstrate two variations with their individual pros and cons. Tyke uses the island *University of Hamburg*, which houses the real University with its main building and several areas for projects; see Figure 1 for some impressions of the island. The realistic design for some buildings (1) was chosen as a contrast to the imaginary projects we expected by the students in the surrounding areas, eg the bottle-shaped factory (6) or floating buildings (4) for the role play experiment. Even though the University of Hamburg initially intended not to transfer or project their classes into an exact virtual replica without any further adaptations, we finally agreed on an exact copy of the main building façade including some inner specifics like the most known lecture hall. The latter one was necessary to simplify the announcement of

Figure 1. Impression of the University of Hamburg and its projects: (1) main building and welcome area, (2) aerial view of the island, (3) (4) main classroom and meeting point for classes, (5) sandbox for students, and (6) bottle factory for production process demonstration



classes in the university calendar allowing student to find the real and virtual place (3). As shown in the Scenario 2 below, the classroom is also used to merge the virtual and real world by providing corresponding views allowing the students to choose their preferred environment while not being left out of the (social) integration. The sandbox (5) allows students to experiment with the building process and provide room for the first objects. The factory (6) started in such a box and was later transferred to a reserved area. Other projects and technologies on the University of Hamburg are described below; see also (Burmester et. al,

2008; Reiners and Voß, 2008; Wriedt et. al, 2008, Dreher et al. (2009b).

Meanwhile, Jass created a meeting place, *Education Online Headquarters*, which is used to meet before and after visiting other locations within the virtual world. This ensured that when a lesson was being conducted, the students knew where they have to meet. *Education Online Headquarters* (Figure 2) is a two storey area, traditional indoor area with lounges and coffee tables and a conference style setting in the corner or an outdoor area with picnic benches, log fires, wooden bridge over stream and cushions to sit on. The following

Scenario 1 describes her class and the impressions from the participating students.

SCENARIO 1: JASS EASTERMAN – DISCUSSION GROUPS AND VIRTUAL LECTURES

In comparison to real life, their physical body was allowed to be at any place as long as their avatar appears and is tracked. The first example is a lecture where international experts were invited as guest lecturers who did the teaching without spending any expenses. Beforehand, a designer supported the speaker to setup a look-alike avatar so that students notice and remember the person as well as gadgets to be used for demonstration. Communication was done using a designated chat being monitored by a moderator and either used for immediate questions or later discussions. There was the option of using voice, however it was not necessary and students would require the necessary hardware and know how to use it. It is also higher on bandwidth. However, voice/audio was used on some occasions when required, particularly for demonstrations and performances by the students.

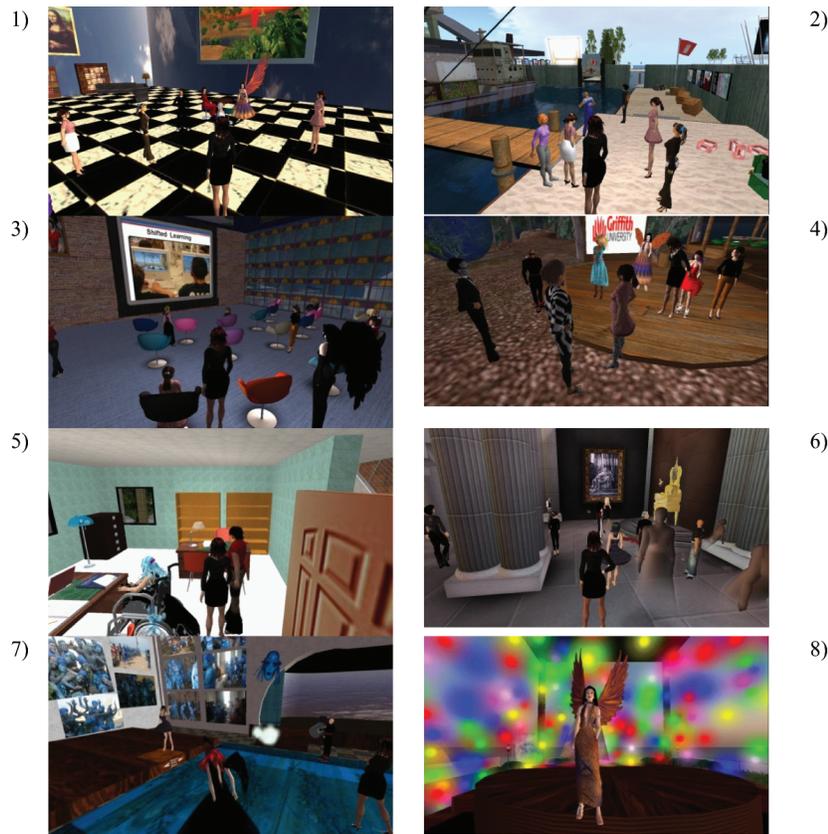
Students enrolled in two technology education units were given the opportunity to participate in virtual world sessions with Jass to assist in the completion of an assessment task. On average there were 6.5 students (out of a possible 12) in attendance on each evening with two guests (this could be educators, student's supervisors and interested people). The evenings were scheduled to be conducted from 7.00 pm to 9.00 pm. Students arrived, on average, 11 minutes prior to the scheduled starting time and left 36 minutes after the scheduled finish time, with sometimes leaving over an hour later. This could be because they were immersed in what was happening or the guest lecturer was still speaking. Jass wasn't able to attend for the full time on two occasions. However, she

placed her avatar inworld to record dialogue. It was found that these non-compulsory sessions drew the students inworld even when there weren't tasks given or lectures to attend. On the first occasion, the dialogue between students began at the normal scheduled start time and concluded 26 minutes after the scheduled finish meeting time. All students within the two units of study received grades of Distinction or High Distinction for their assessment tasks. External markers, not the lecturer, marked these.

All students were informed of and approved the data collection methods prior to commencement. The protocol was also distributed to all participants for later review of the class and preparation for the final assessment task. The protocol was anonymized for all other application, eg, evaluation, reports, or citation in publications. Note, that the usage of avatars even allows hiding any ethical or cultural backgrounds within a class as the true identity must not be revealed to other students. The teacher needs to know more information with respect to authentication and later grading of the course work. Using the chat, even the accent in the voice is masked.

Students in these units attended the meeting place created for these sessions for discussion in the first hour of the scheduled meetings (Education Online Headquarters). The second hour was spent visiting educational institutions in Second Life around the world to hear or see what guest lecturers were doing with their student in the virtual world. This model of workshops was devised after the first session when it became apparent that those participating were studying many different disciplines and therefore it would have been difficult to teach them something specific. These students were studying to become primary, secondary school, or higher education teachers. This meant that their Key Learning Area (KLA) could have been anything from English, Science, Mathematics, Religion, Information Technology, History, Geography, Art, Music, Drama, Economics, etc. And, they were.

Figure 2. (1) Education Online Headquarters; (2) University of Hamburg; (3) St Joseph's College; (4) Griffith University; (5) Disabilities Unit, University of Torino; (6) MacBeth, University of Sydney; (7) Deakin University; (8) Student Performance with voice, dance, lighting – Education Online Headquarters



From week to week, students went to many different universities or schools to listen to the guest educators. They were also given a document with various locations that they could visit according to their particular KLA. These included places such as Vassar which houses a duplicate of the Sistine Chapel, complete with Michael Angelo artwork, the Louvre with its famous glass pyramid roof with artworks such as Leonardo de Vince and Rembrandt or International Space Flight Museum where rockets that have been used in training NASA astronauts are housed, Star Trek Museum to see memorabilia from the

television series, or go to a live performance of Shakespeare. They could also visit great icons of the world such as The Great Wall of China, Uluru, Eiffel Tower, London Bridge or the Grand Canyon. Students were able to visit the places of interest on two separate evenings or on other occasions that they were able to do so in their own time. To take students to these locations in reality would be unrealistic, costly and impossible. This was possible in a virtual environment. As one student commented “In a strange way I think exploring a virtual world can actually make that world more real than say looking at pictures or reading texts

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or even viewing a video” (Gregory, 2008). These students were exploring the possibility of using a virtual world in their future teaching. Learning objectives of their studies were to integrate social computing technologies as tools for learning in an educational setting; strategies for using information from electronic media; and the educational use of software. They were able to achieve these objectives in their Second Life sessions.

Towards the end of the semester, students were to give a short presentation on how they would use Second Life in their future teaching. The group insisted that a stage be created for these presentations. This was an opportunity to teach students some basic building skills so a stage could be created to present their learnings. As talent was found amongst the participants, they also demonstrated these. One student performed by singing, using audio, lighting and dance and was viewed by a very appreciative audience of fellow students and invited guests. Dance in Second Life is scripted and, this particular student, demonstrated skills in enabling her avatar to undertake several dance routines, change the lighting using “particle effects” and sing accompanied by the keyboard through the audio features. Another demonstrated how they had manipulated script to enable a butterfly to move in a pattern around their avatar. Another showed how they could use Dragon Naturally Speaking to speak the text that was written, instead of typing, for others to read. Another discussed how they would use the Shakespeare environment for her students in English. “I will take my... students to the Globe Theatre in-world to experience one of Shakespeare’s plays in its correct environment. Along the way I plan on providing my students with several activities that will encourage them to explore and create ideas of their own” (Gregory, 2008).

Some reactions to the workshops from different students (Gregory, 2008):

- “I had my first visit to 2nd life on Wed and it was a blast. I can see the students

engaged in this environment and developing understanding in life skills and applying these to real life.”

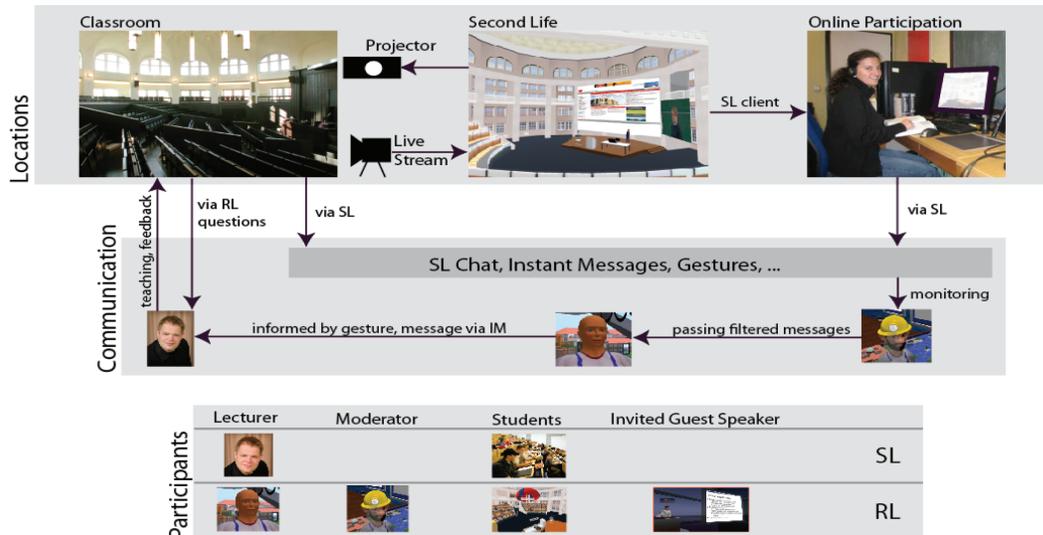
- “Well, had another interesting session in second life last night. It all seems to be coming together as our understanding and control increases. Other students have some useful ideas and have been very creative with their outfits and abilities... I think that this tool has great potential for use in schools once it has been developed to cater for the security issues that will arise. At first I did not see the use for English in particular but have since changed my viewpoint and now feel that it would be a great learning tool for students. It has the capacity to be individualised for every class and teacher and therefore will become essential in the future.”
- “I love these discussions Jass! I am going to miss them.”
- The weekly sessions ... “they are the highlight of my degree”
- “It has been one of the highlights of my entire uni life! (This is my 7th year of uni... and only performing in operas has been better)”

Below are some images of the excursions that took place in the student workshop – the first image being Education Online Headquarters where students met each week prior to venturing off to their lecture. The following are where students went to attend inworld lectures in Second Life with guest lecturers from around the world.

SCENARIO 2: PRODUCTION AND LOGISTICS IN VIRTUAL WORLDS – CLASS AND PROJECT

The second scenario is placed in the area of production and logistics, and reveals how integrated blended learning can be offered in a real class-

Figure 3. The setting for the blended learning experience



room while students also participate alongside the lecturer in the virtual world. The learning design had a focus on both the real and virtual world. While the virtual world was used to create students' own understandings of logistic operations, the real classroom was used for presenting the traditional learning material like slides and videos covering the basic theory in this field. Nevertheless, all content was also projected into Second Life including a live stream of information from the real world so that students could follow the lecture by attending with their individual avatars. The effect of immersion was enhanced as the live stream provided a window to the physical world. Communication was handled through audio and chats, whereas questions needed to be sent as a chat message to a designated avatar in the role of a moderator, who preselected questions and remarks for the lecturer, who is then being informed by signals, for example, a raised hand of the designated avatar. The setting is outlined in Figure 3.

With respect to the students' experiences with Second Life, the first (optional) session was given in the real-world classroom to introduce the tech-

nology and the procedure for the semester. For the following mandatory sessions, the students could decide if they participate in the classroom or join from any other location via the Second Life client. In addition, Second Life was the main teaching platform as experts and practitioners were invited to demonstrate their logistic operations by meeting at factories, companies or universities within the virtual world. Whereas this causes problems with travelling and financing in the real world, it is more or less *one click* to teleport students to new learning spaces. Here, we experiment with different approaches, whereas Tyke intended to involve the students as much as possible and demonstrated different types of Second Life installations. As mentioned above, Second Life allows a high degree of freedom in design and logic, so that the installations can either be closely related to the real world in terms of processes or design, or use the technology to send out a specific message. In this specific lecture, we visited four locations (Erlenkötter, 2008):

- 1) **Funny-frisch:** Snack producer who designed the factory and the processes as they are in

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reality. This includes planting and harvesting the potatoes on a field, to cleaning, cutting, roasting, flavouring, packing and testing the final product. At each step, the process and product are detailed and explained focusing on the quality aspect and transparency of the product and its ingredients.

- 2) **Ben and Jerry's:** The ice cream producer targets an audience that is interested in the production process but does not miss on the entertainment part. Before even entering the factory, each visitor can start a game, where cow droppings have to be collected for Linden Dollars and then reused for producing energy and fertilizer. Within the factory, all processes are shown as they occur in the real world, whereas the presentation is exaggerated in terms of having huge comics on the wall and simplified machines that reminds the visitor rather of a walk-in cartoon than a factory.
- 3) **Fiat:** The car manufacturer concentrates in the demonstration of its Brazilian factory on the environmental aspect. The factory is filled with green areas, trees and clouds. The whole area is covered with trees and other plants. The production process itself is belittled in a way that the focus is set on the process rather than the car. For example, the tires are cut by a huge knife from a sushi-rubber-roller, the tires are added in a pit stop style and the final inspection is done under a microscope.
- 4) **Double Happiness:** The original Double Happiness manufacture is an artist's studio at Eyebeam New York City, where the Second Life factory is fully integrated in the production process of jeans (Hafner, 2008). The main concept behind this setting is about visualizing the concept of sweatshops and its problems for all involved roles—a sweatshop is a working environment with very difficult or dangerous conditions, usually where the workers have few rights or ways to address

their situation. The look is very realistic and includes avatars to actually operate the machines in Second Life for a very small salary an hour of around 90 cents.

The feedback of the students was ambiguous. Besides the fact that it was a new way of learning for them, they liked the freedom to choose from which location they participated without the feeling of being excluded from the class. This was intensified by a *window* to the classroom through the live stream. Nevertheless, the doubts about the usability for the field of production and logistics and if it is a current hype that will disappear over the next years was used to have intensive (mixed world) discussions that are unlikely to happen if the presentation was only done by slides and no further hand-on experiences.

Compared to many other reports where students complain about the technological barrier, we did not have too many complaints. In contrast to the other scenario, most students in Germany have a flat-rate without any quota on the monthly data downloads and a rather large bandwidth up to 16MBit/s. Most of the data transfer resulted from the live stream rather than Second Life and can therefore be compared to video conferencing. Some students did not have an advanced graphic card and had to limit the resolution on their client. Nevertheless, they did not seem to care about this as the content was far more relevant to them than the degree of details like shadows or anti-aliasing. Furthermore, no student was left behind due to their equipment as they could participate in one or the other way: (1) joining the class in a computer lab with well-equipped computers or (2) limiting their experience to the video stream which did cover all content but the participation.

In summary, the students learned about virtual worlds, their usage with focus on production and logistics as well as gained insight of some uses cases. In contrast to a traditional class with frontal presentations, all students participated through an avatar and had the opportunity to

visit several location, interview international experts and experience how new installation can be constructed. The general feedback conducted by an anonymous questionnaire showed that more than 80% grade the experience with an A or B and only 12% with a C or D. For the worse grades, the student provided a comment that the grade results from some technical problems at their place with respect to the live stream codec (Second Life was working) and the rather practical than theoretical concept. The later critics are considered for the next class, where Second Life is used as before but the number of visited locations is reduced to have a better coverage about virtual worlds and their advantages/disadvantages in real world scenarios. Other comments in the questionnaire are about the flexibility in how to join the classroom, the invited guest speaker and the *courage* to try new technologies to improve the teaching at the university. Even though most students came to the classroom (overall 65% each session), the experience from home was rated B or better as they had the option to ask question, participate in the excursions and communicate with other students. The communication was very well accepted as they could have private chats not being visible to others. From the perspective of the lecturer, it might be better if students focus 100% on the class; on the other hand, this form of communication is at least not interrupting the class and students pay attention whenever they waited for an answer and came to class despite the option to just meet somewhere else (note that participation was not mandatory to pass). Inviting guest speaker was rated A by all students, besides some comments related to the English language and problems with the accents. In general, we try to have invited guest speakers from other universities or companies in the classroom to provide some insight in real world scenarios, but are limited to local guest due to expenses. With Second Life, it took not more than 30 minutes in communicating the technical details and starting Second Life on the computer of the invited guest speaker. Further-

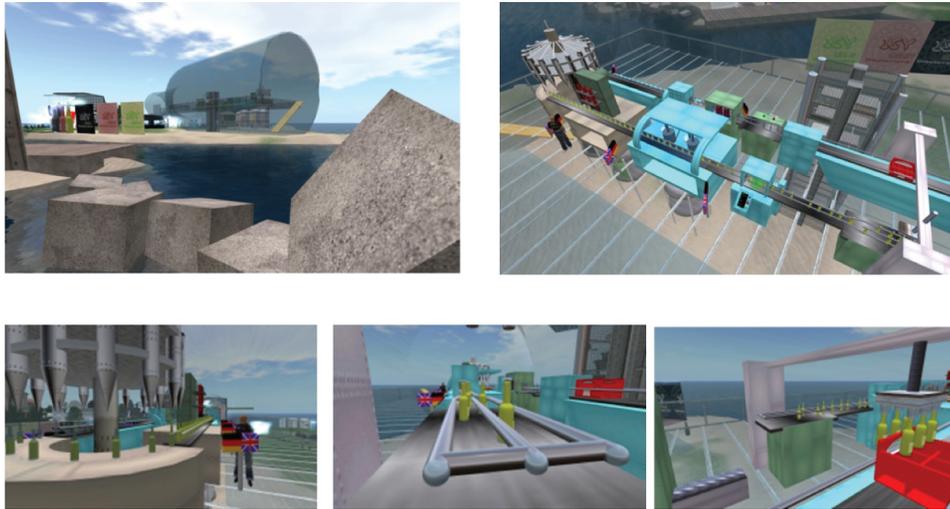
more, the guests liked this as they did not need to travel but could talk from their office.

The following project is only related to the class as the participating students choose Second Life for their implementation based on their experiences. The project is discussed in more details in Erlenkötter (2008) and described here as it proceeds with the subject from the class. In Hamburg, Information System students have to work on a larger (team) project for 4-6 months, where they have to design and implement a software application while learning about teamwork and collaboration. Instead of providing all details, the assignment was only one sentence (*Use Second Life to demonstrate a production process*) and three milestones: (1) present the project idea and the tasks to achieve these, (2) decide on a possible dissemination channel and (3) implement the production process. The students created a list of ideas, but settled on a production line for soda drinks being bottled and shipped in cases of six bottles each. The decision process was accompanied by contacting several companies to provide input details or even sponsorship, but as expected, without success. Nevertheless, the project was realized within five months and fulfilled the expectations by far. Besides presenting a complete implementation instead of the required prototype, they also paid attention to small details and experimental functionality like small games for an interactive experience. With respect to the dissemination, the students decided on a conference publication (Erlenkötter, 2008) as well as draw the attention of newsagency to the project resulting in full page coverage in a nation-wide newspaper. The outcome of the project is shown in Figure 4.

A later analysis and discussion about the project development showed that the students got most of their motivation from the media itself. Main arguments used by the students are the collaboration as they generally worked from their own computer at home and the immediate visibility of results. In addition, several avatars from all over

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Figure 4. Different views of the bottle factory



the world visited their building site and asked questions about the project, which showed the students the relevance of the project. They also admit that it was only possible due to the features in Second Life and that other virtual worlds would probably cause more work in terms of learning the basics and of implementing the production line. None of the students had experience with the script language but managed to get the first implementations after short learning period of just a few days. The project will be continued in two ways: (1) having further student projects that add more features, eg material ordering, sequencing of orders, or integration in a supply chain, and (2) finding sponsors that support the idea and provide the funding to continue the implementation.

PEDAGOGY

The pedagogy around how virtual worlds are used is important. The environment has demonstrated that it can be engaging for students. It appears that where educators choose teaching strategies that can assist students in constructing knowledge that students feel motivated and that their learning is purposeful. The use of a virtual world was

considered in great detail before embarking on its use. Each institution had to decide whether a virtual world could be used as a sound educational tool and be implemented in a pedagogical manner. Virtual worlds support constructivist pedagogy where students use technology to explore and reach an understanding of concepts where they are encouraged to explore and test. Second Life has been created to encourage users to explore and test and educators have the opportunity of using this resource as an enhancement to the pedagogy they already use or as an alternative. When an educator uses Second Life as an educational tool, they are using a “full and diverse range of pedagogic approaches” (Hollins & Robbins, 2008).

The Quality Teaching Framework (NSW Department of Education and Training, 2004), Australia, state that the common traits of good teaching are three-dimensional:

- Teachers construct a learning environment with a high level of intellectual quality
- Teachers make lessons relevant or significant
- Teachers construct a classroom that has a quality learning environment

Intellectual quality builds from a recognition that high quality student outcomes result if learning is focused on intellectual work that is challenging, centred on significant concepts and ideas and requires substantial cognitive and academic engagement with deep knowledge. This is supported by Bloom's Digital Taxonomy (Vieyra, 2006) where the use of a virtual world builds on concepts starting with the lower order thinking skills of remembering, understanding and applying on a continuum to the higher order thinking skills of analyzing, evaluating and creating. When using a virtual world, the users have to firstly learn how to use the environment, as they become more familiar, they are able to undertake other tasks such as learning how to use the environment to support their teaching.

Learning is improved when learning environments provide high level support for learning, such as when educators support their students in a virtual world by teaching them how to operate in the environment and the various protocols for using the environment, creating a quality learning environment. It needs to be a positive, caring, safe and supportive environment, both for the educators and students. Students need to see why, and understand that, their learning matters so that they can see how the virtual world could be significant to their future teaching.

Digital media has had a significant influence on students using a pedagogy that incorporates ambiguity, learning and affect (Carr et al., 2008). Virtual worlds such as Second Life assist their educational needs using methods they can identify with. The pedagogy of educators will vary depending on their level of experience with a virtual world. When viewing any educator that has been using a virtual world for a while, you will be privileged to watch a highly interactive, educational and engaging lesson.

Ryan (2008) describes sixteen pedagogical applications of Second Life. Visualization was used in both scenarios outlined above. In Scenario 1, Jass had students visualizing how they would

use the virtual world in their future teaching by offering them a wide range of experiences and in Scenario 2, Tyke required students to visualize how they could set up a bottle factory in Second Life the same as they would in a real situation. Both scenarios used an Interactive Library of virtual resources to create learning environments that balanced technology and good teaching. Students attending sessions in Scenario 1 were both face to face and distance students. The lecturers and students were able to connect but were not in the same physical location. They were situated in various locations around the world. Both scenarios demonstrated the use of sending messages, inventory items or notes via Second Life to students synchronously and asynchronously, so that they would receive these notices when next they logged on. Scenario 2 demonstrated some excellent forms of role-playing, whilst the students in Scenario 1 watched role play being undertaken by others (performances).

An important aspect of Scenario 2 was where students were given the opportunity to test hypotheses through trial and error, although students did this to a certain degree when first learning to use Second Life. Scenario 2 also demonstrated the use of games for learning for students.

Scenario 1 demonstrated Ryan's pedagogical application of soft skill development where the pedagogy is not task-oriented; the virtual world was the "method for practicing the desired skills". This Scenario used a variety of skills such as "critical thinking, problem solving, team building and collaboration" (Ryan, 2008). Jass and Tyke used the virtual world of Second Life for students to research by enabling students to "explore, question and contemplate course material". As Ryan points out, this enabled students to transfer what is learned in the virtual world to a different context.

Again, both scenarios took students on virtual field trips that would not be possible due to a variety of constraints in the real world. Scenario 1 used tours as part of the learning for students so that they could experience a variety of uses of Second

Life in their future teaching. As stated, students stayed over time in the environment because they were engaged, having fun and learning.

As Second Life is a social space, many social activities were undertaken. The format of Scenario 1 was so students could use the environment as a social and learning environment. Scenario 2 found that when some students were in Second Life they were more communicative than when they were in a face to face learning environment.

In Scenario 1, none of the students knew who the other students were in real life. This enabled them to create anonymity if they wished. All students were aware of who all the educators were and Jass knew who all the students were, however the guest lecturers did not know who the students were. This enabled students to be honest and in some cases, take away shy personalities that face to face situations can create for some.

On one virtual lecture in Scenario 1, a guest lecturer discussed how they used machinima with their students, which is the capture of video in Second Life (recording of Second Life role play). Another application of Ryan is recruitment and both institutions had to recruit the support of their institution to embark on this different way of teaching and learning. Ryan also points out that students are under more pressure to increase their expectations when their work is put on display and this is what happened in Scenario 2. These students worked together in given timeframes strove to perform perhaps more than they would have in a face to face situation. Virtual Worlds such as Second Life provide a platform for learning by using building techniques “applying learning by doing”. Finally, Ryan’s last pedagogical application is virtual action learning, where students learn by “enabling, interaction and collaborative technologies”. Both scenarios had students involved in the decision making process. Scenario 2 had students create their bottle factory by utilizing inquiry, action and reflection. Scenario 1 was an open ended learning environment and evolved from student input and academic requirements.

Organisation

Of course, with any venture like this, support and commitment must be sort from the educational institution so that they are able to set up the technical access for educators and students. The University of New England in Armidale, Australia, supported Jass and the University of Hamburg in Germany supported Tyke.

Equity

Students who have the opportunity and availability to use a virtual world are perceived to be ‘luckier’ than others. Therefore, using a virtual world is not equitable. There are issues involved with access that prohibit some users in being able to participate in a virtual world when they wish to do so. As noted, in some institutions there have been far more applicants than positions available to use Second Life for their studies. The fortunate students that are selected to engage with the environment and educator experience a different learning to the other students. In the scenarios outlined, the use of Second Life was totally voluntary and all students who wished to become involved were able to do so. As the desire to use a virtual world for their studies increases, this may not be the case. Also, as technology improves, all students who would like to use the available technology should be able to do so.

The equity issue is not something that is examined here but the educators are aware of its presence. To date, they have ensured there is not an equity issue with their students, however, this will change as students become more aware of its availability, enjoyment, engagement and different way to learn and wish to become involved in this technique of learning. As improvements in technology, accessibility and broadband increase, we should be able to accommodate this increase in student numbers.

Despite the advantages for the students, there is also another issue about the equity that has

to be considered in the future. As shown in the Scenario 2 above, some students said that they would prefer the traditional way of teaching and we have to assume that there is always someone who does not *feel* right to have a virtual avatar instead of participating in person. Therefore, we intend to have further research about the interface between the worlds and how we can merge both worlds in a common learning environment, where the students have a true choice according to their preferences but without missing some experiences. We are aware that some features might not be given in the same way (eg building objects or implementing scripts), so that we focus on the socializing component that includes the classroom, group work and collaboration in a distant education setting.

Access

Access to the hardware and software has been a challenge for some students making it impossible for them to participate. Besides not being able to access Second Life on campus, others have had to upgrade their computers with RAM and video cards. Others found that they didn't have the required bandwidth and withdrew. This barrier to students should be removed as technology is upgraded to be able to deal with these access difficulties. In Australia in July 2008, research from the University of Sydney reported a new ultrafast optical switch on a chip that could speed up the Australian Internet by more than 6000% (Salleh, 2008). In Germany, most students either have a flat rate or access to equipment at the university, therefore, the students did not have the access problems that we expected before the class started. Nevertheless, Second Life is still a platform with limitations. If it comes to media and in-world Internet access, it was rather challenging to setup the live video stream and support students with getting the correct codec installed on their own computers. The feedback, as described above, was very good, even though some students reported

that they could access Second Life only with a low graphics resolution and limited visibility. But as the focus was on interviews and concepts used in the virtual world, the lower resolution had no disadvantages for the students. There can be problems with the voice chat quality and unexpected failures of the Second Life clients and/or server. We prepared for this by providing the same live stream also on a different server, but never run into troublesome situations. The voice quality, even including guests from the U.S. and Australia, was similar to the one of Skype and only had short periods where noise influenced the quality, but always clear to understand.

Note, that the speed of technology development is increasing and the prototype/beta status of virtual worlds is finally over, we see fewer problems with accessing the virtual worlds. The software is stable and requires fewer resources (graphics and CPU) such that students will not run into the same problems as described above. In March 2009, we used a netbook (Asus Eepc) to run Second Life and actually build something without problems, even though the graphics quality was set to low. Nevertheless, the hardware and software should be tested and the course design adapted to the resources. With respect to experiences in virtual worlds, we can conclude that the time to learn the interface, to navigate and to start being productive is very low compared to many other software applications. Most of the time, participants felt comfortable with the environment as it is in 3D and therefore comparable to the real world, i.e. as the current students are used to this kind of interface due to media like videos and gaming. Administration is only a small task and requires little work as Second Life is a Web-application and not installed at the institution itself. The major administrative part is the assignment/invitation of avatars to groups and recording of the instant messaging for the protocol.

Cultural

By using a virtual world, cultural barriers are lowered as the avatars are, by default, not indicating a relation to the real user. Most students start to individualize the generic avatar and might integrate indications to their culture or social background. But it is not completely visible to others unless being announced by the user itself. For the described scenarios, we chose to have a relative neutral setting and allowed the students to define their identity themselves. Obviously, we had to decide on the language as a commonality to understand each other, but even here, we could hide some of the origin by using instant messaging in some lectures. Typed text is harder to project on a certain culture than spoken words.

In the two scenarios, it is a requirement of students to be able to speak their native tongue (i.e. German or English) to enrol in their studies. Therefore, all barriers are removed as all students perceive others in the virtual environment to be the same as themselves. A good example of this is in Scenario 1 where students visited locations around the world where the guest lecturer's native tongue wasn't always English; however, this was not a barrier to imparting knowledge. All guests spoke using text to ensure equality of experience as some students weren't able to access sound or use microphones.

The effect of culture, nationality, race and mother tongue with respect to socializing and participating in the virtual world is an interesting aspect for future research. The usage of avatars allows changing your actual body specifics and relations to cultural groups. People with disabilities or certain body attributes can choose to be anyone (or anything) they want and socialize without possible limitations. On the other hand, several experiments in Second Life were conducted with students that participated in a role play where they had to experience every day situation from another perspective: being handicapped in a wheel chair in a non-accessible building, member of a cultural

group that is harassed or under influence of drugs. Students describe that the immersive experience in a 3D environment opened their eyes for other situations and that they start to understand the problems being involved with having limitations in the everyday life. University of Hamburg is currently developing a scenario simulator where students can experience controlled mobbing or sexual harassment situations. The idea is that a student is briefed for a scenario (eg a job interview) and either has to select an outfit from a wardrobe or an outfit is randomly assigned. Afterwards, the student teleports into the scene and confronted with a (recorded) voice that might or might not be offensive. The student has a selection of possible answers that can be used as a reaction. Afterwards, the student is teleported to an area where a multiple choice sheet has to be completed. The student has to decide if this was sexual harassment (or mobbing in a different scenario), if the clothing might have influenced the reply and if the avatar was using the right reaction on the offensive behaviour.

A study undertaken at Deakin University in 2007 looked at the culture and cultural differences in the online environment and considers what strategies were effective in teaching a culturally diverse cohort of online students (Goold et al., 2007). They concluded that online learning environments enabled greater numbers of students of diverse educational and cultural backgrounds as well as modes of study to come together within the one virtual classroom. The diversity within a virtual classroom is more likely to be greater than in a physical classroom. In an online environment, many of the clues that enable culturally sensitivity are missing. They conclude that students need better preparation for learning in an online environment, an understanding of diverse communication styles.

Economic

Virtual worlds also provide economic implications educational institutes and the involved students. There are costs implications on the real life campus, the educators and the students. For the students, the cost is limited to the technology required for the access. Generally, students are already equipped with computers capable to use Second Life and other worlds; therefore no further investment is required. On the other hand, the students need access to the Internet with high bandwidth and large amounts of free volumes. Not necessarily for the virtual worlds itself but for the voice and possible video usage during the lecture. In our case, the students were either in distance education and used to video and audio lecture, or it is common for the country to have the unlimited access to Internet resources.

The university might have to invest in the project. The universities would have to reconsider how their campuses are structured. Instead of creating lecture theatres and workshop areas, they may also have to create new computer labs, or alternatively, supply the students with computers for the duration of the studies. As we see it as an additional tool for studying, the need of computer and lecture halls might be the same, whereas the utilization decreases in advantage of more and smaller lectures. In addition, the institute needs to invest in the virtual worlds, which is the cost for the space as well as generating content. But this is comparable to other high quality material and therefore not increasing the cost but shifting the type of content. Other cost factors could be the hosting of virtual worlds in the future, which would require a server as well as administrator.

Meetings could be held in the virtual world where it would enable the best staff to be employed because they wouldn't have to physically be in location on campus. They could be located anywhere worldwide and have real discussions and presentations in the virtual world.

Education institutions could hold conferences in the virtual world and participants wouldn't have to endure the cost of travel, accommodation and time for the travel. They could also be more cost effective by attending a virtual world session and still be working at the same time.

As the virtual world is an environment that has been created to emulate real world physics, experiments could be held without the implications that occur in the real world, such as harming someone, using expensive equipment and using participants that in a real world would not be possible (such as demonstrating surgery without the need for a real patient). Dangerous chemicals could be used to demonstrate an experiment, without harming anyone. Spacecraft created to react with the environment as it does in the real world could be used without the costs of creating the spacecraft, the harm, or loss of life, if the mission was unsuccessful.

Social Factors

We generally argue that virtual worlds are one possibility to tear down barriers and work on a better environment for students, teachers, and every other user. Nevertheless, there is one barrier we like to have for individuals or as part of (social) experiments: no one knows who is controlling the avatar. An example of this was one guest lecturer was profoundly deaf and had difficulty speaking in real life, however, the students were totally unaware of this and he was treated as anyone else was, which may not have been the case in real life, particularly as it would have been difficult to understand him and he couldn't hear people very well. This session was undertaken using text only and was thoroughly enjoyed by the students. One comment from a student was "Virtual Worlds are here to stay; they are already being used in Universities so it is a matter of time before schools are employing the technology. They offer a plethora of opportunities for students with learning problems,

disabilities and mainstream students to expand their learning and experience different ways of learning” (Gregory, 2008).

We are aware of the fact, that this is an ideal scenario, but unfortunately, virtual worlds have to handle the same problems as the real world. The social behaviour is unique as it provides other opportunities to, e.g., communicate, bond, or make new enemies. The avatars – and we assume that the personality of the avatar and user must not be necessarily the same – interact with others, group and share information about anything. Avatars will find their role in the group, while others leave or are excluded; see Minocha & Tingle (2008), Grove & Steventon (2008), Hollins & Robbins (2008), Gee (2008) for a deeper discussion on this issue as it will become an important needs to be part of future research. In our classes, social factors were not an issue besides the abovementioned cases as we used a closed environment where only students were invited to join and being asked to behave nicely to each other. Which worked perfectly in our cases as the group was small and friendly to each other. In cooperation with a German agency, we are currently experimenting with ideas that allow detection of misbehaviour in a defined setting. That is, for example, avatars disturb a lecture, try to destroy or modify the work of others or use inadequate language. The detection allows to initiate counter-measurements as communicate about the behaviour or to ban someone. Social behaviour is, similar to the real world, difficult to control in advance, but we take precautions to interfere as soon as possible by being present and keeping close relation to the participants such that any problems are reported and discussed.

FUTURE DIRECTIONS

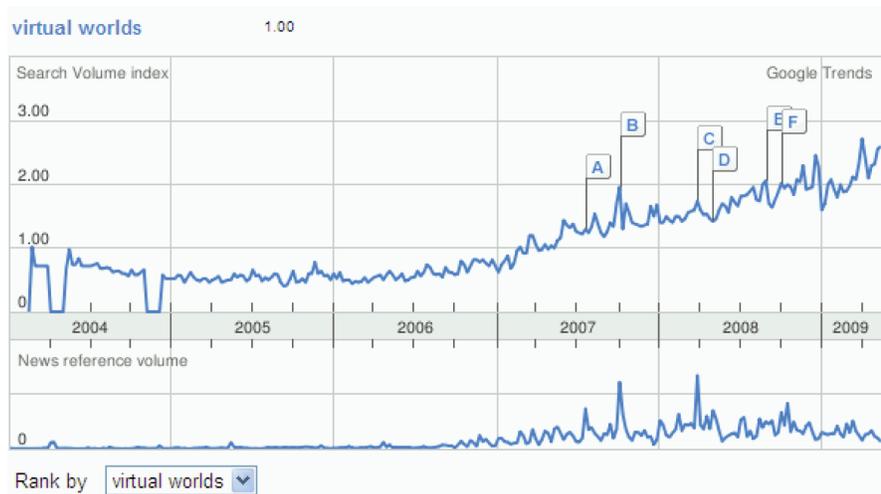
The web has created new opportunities for the world’s population to engage with each other. The explosion of the large scale social construction of knowledge via social computing software, social

bookmarking, vast taxonomies and ontologies as in the Open Directory Project and Wikipedia, blogs, wikis and so on, has created engagement that is common in Web 2.0 technology environments. Latest projects are Twitter in Second Life or the integration of in-world information or status of avatars on common web-sites. Virtual worlds, whilst part of the explosion, are relatively unexplored in the education domain, perhaps because they stem from the role playing game phenomenon. When applied in the education field however, virtual environments such as Second Life do provide an emerging alternative for the creation of learning spaces that have the potential to offer students and teachers some exciting new possibilities for achieving educational objectives.

According to Fenn et al. (2008), public opinion regarding Virtual Worlds is currently in a stage that the Gartner Hype Cycle calls the *Trough of Disillusionment*. In contrast Hayes (2009) sees Virtual Worlds as mature for (higher) education and as being located in the upper part of the *Slope of Enlightenment*, and therewith near the *Plateau of Productivity*. Considering the change of acceptance in the research community and the start of numerous projects over the last months, we feel confident to predict that 3D spaces will become an integral part of education (ie in combination and seamless integration with other media and technology, and across a variety of learning paradigms). This expectation is supported by *the Internet community* where the search term *virtual worlds* is raising over the last years; see Figure 5.

Our future (research) influenced is based on the described experiences as well as the trend to bring the virtual and real world closer together. There was an extensive learning stage to identify the opportunities as well as possible scenarios for future integration. The lesson learned is used to define new and promising challenges for teaching and learning. We have several projects (besides the ones describes in the scenarios and the cited references) that explore the interconnectivity between virtual and real space focusing on tech-

Figure 5. Trend of the search volume of virtual worlds; Google Trends (2009)



nology to intensify the immersive experience as well as lowering the access barrier even more; see also Dreher et al. (2009b), Dreher et al. (2009c) as well as Reiners et al. (2009) for some thoughts on how to bridge worlds. Note, that Dreher et al. (2009c) also describe how virtual worlds integrate at different learning stages, ie K-12 up to life-long-learning.

Nevertheless, we want to emphasize again, that we see virtual worlds as an integral part of future education, but not THE future, as education in the classroom and eLearning in a traditional LMS will co-exist and even be superior in terms of time being used. All *worlds* will come closer and melt to a new form of education as education always needs to adapt to the expectations and requirements of each individual learner. These learners are from a continuously evolving society with new technology, beliefs, socializing, etc. Educators need to be aware of the changes and have to react on them. Preparation by learning from existing examples will help to know what to do. No case is exactly like the next, so that self-experiments are the key element to be confident in the coming technology, which might not be Second Life but promising approaches like OpenSim, Croquet or Project Wonderland.

We outlined rather positive experiences that demonstrated the advantages of Second Life from our and our student's perspective. We described some drawbacks and risks that are connected to Second Life and being in a virtual world. We did not focus on this as learning in virtual worlds is most of the time very similar to distance learning (in the real world) so that the pros and cons are very comparable, especially considering social and group behaviour as well as pedagogical models; see eg Hollins & Robbins (2008), Carr et al. (2008), Ryan (2008), Minocha & Tingle (2008), Grove & Steventon (2008), Hollins & Robbins (2008), Gee (2008).

CONCLUSION

The virtual world of Second Life has been found to immerse students in the environment so that they have the feeling of actually being in a real life discussion with the educator and fellow students, undertaking tasks as required. This is an emerging technology that is being explored vastly by institutions worldwide and evidence is beginning to emerge to support the statements that this is an immersive, engaging and collaborative environ-

ment. Second Life lends itself to education and is an area where much more research should be conducted to identify its strengths, as well as any pitfalls it may have. This chapter has analysed the environment from two lecturer's perspectives and provided an insight, how an alternative way of presenting the learning material can be done if we are open to new media formats. We initiated the courses as an experiment to evaluate 1) the usability, 2) the acceptance of the students, 3) the learning effect 4) the behaviour of the students and 5) the integration of Virtual Worlds as part of courses in general. We found Virtual Worlds to be an excellent way to teach students the learning material that is required for their studies in a different format, Second Life, in a collaborative and engaging environment from different locations around the world, at the same time. The participation – involvement in the discussion and interest in the learning material – was above average, which was observed as well as shown in the later interviews with the students. Nevertheless, we see the technology at its beginning with a new generation that is used to be in a three dimensional environment. Virtual worlds might not replace the Internet but substitute content that requires a higher degree of visualization, interaction, dynamics, collaboration, etc. to have its full advantage. And with a growing number of use cases, institutions and companies start to implement new and innovative applications like 3D content management systems to build libraries, as it is common for the traditional literature.

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