

The use of Virtual Environments for knowledge sharing in education and industry

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Abstract As virtual world technology becomes more common, this paper considers how educators and industry can leverage the tools and systems of this medium, to enable engagement and knowledge transfer between parties, in both education and industry.

1. Introduction

Virtual world technology has become a part of many users online experience. Traditionally this may be in the form of MMOG's (Massive Multiplayer Online Games) such as The Sims or World of Warcraft, or MMOLE's (Massive Multiplayer Online Learning Environments), which enable staff and students to explore many aspects of the learning structure in a virtual 3D environment. The virtual environment is also being used more extensively by business and industry. In an article by Golnaz Sadri and John Condia for The Institute of Industrial Engineers they state that; "The use of virtual teams is growing. A 2010 survey of employees at 600 multinational corporations conducted by RW3 CultureWizard found that 80 percent of respondents belonged to a virtual team." In today's competitive global economy, organizations capable of rapidly creating virtual teams of talented people can respond quickly to changing business environments. Capabilities of this type offer organizations a competitive advantage (Blaise J. Bergiel, Erich B. Bergiel, Phillip W. Balsmeier, 2008). With the publication of Open Source software that enables companies to create their own customised virtual world grids, more and more companies are developing 'in-house' systems to facilitate many activities, including conferences, training, seminars, face to face discussion and meetings. The uses of the virtual world environment are extensive and we are only at the beginning of exploring the uses of this technology.

In this paper the authors discuss a Pilot Study conducted with Distance Learner students enrolled on an MSc course in the School of Engineering and Design at

Brunel University, and expands on how knowledge gained during that study will be used within a EU funded project, working with a UK based Insurance Company. This project seeks to enable knowledge sharing between employees of the company, and uses virtual world technology as one of the key platforms for encouraging social networking and engagement within a complex supply chain network.

2.The use of Virtual Environments for engagement and knowledge sharing in education

Students who study at a distance are separated both from their tutors and their peers. This poses general problems to all learners and significant problems to some. Social interaction - the sharing of ideas, discoveries, successes and failures and general social support - are often missing from the distance learning environment. Students frequently feel isolated, start to lose motivation, experience frustration or anger (Wheeler 2007), and a host of other unwelcome emotions, which may lead to dropping out of their course (Martz and Shepherd 2007). In online environments, Haythornthwaite, Kazmer, Robins, and Showmaker (2000) looked at how social cues such as text without voice, voice without body language, class attendance without seating arrangements, and students signing in without attending classes, impacted students long term motivation. They found that the likelihood of students 'fading back' is greater in distance online learning classes than in traditional face-to-face classes. Other researchers such as Hogan and Kwiatkowski (1998) and Hearn and Scott (1998) argue that the emotional aspects of teaching methods have been ignored in the distance environment and that before adopting technology for distance teaching, education must find a way to supplement the social context of learning.

When designing processes, systems and materials for distance delivery, lecturers must therefore consider not only learning outcomes, but also the issue of student isolation and its impact on motivation (Financial Times 2008). The task of the distance educator is therefore to prevent these problems by creating and maintaining a stimulating environment, and offering opportunities for students to communicate with each other and with teaching staff regularly. Lecturers may need to re-examine their traditional role purely as educators, to include a more facilitative and supportive role. In doing so, they will need to develop a new set of skills if they are to be effective educators.

In 2011, the authors developed and piloted a social interactive learning and support environment for a growing body of distance learning students in the School of Engineering & Design (specifically the MSc Engineering Management course) using virtual world grid technology and the platform 'virtual Brunel'. Virtual Brunel has been established as a teaching and learning environment for Brunel University

since 2007 and has extensive 'holdings' in the virtual worlds of Second Life and OSGrid. The main objectives were to:

- Provide a learning and interactive discussion environment for a diverse student body undertaking Masters level education at Brunel
- Develop a social networking community amongst the Distance learning students on the MSc Engineering Management to aid soft skill development, subject development, sharing of practical experiences around the subject matter, student support, group work, etc.
- Measure the value added to learning from this implementation
- Encourage staff and students to develop IT and 'social' skills to support the distance learning student
- Support the learning and teaching objectives of the University (Brunel University, Priorities and Objectives, 2013)
- Share and disseminate the findings and methodologies of the project, and assess transferability to other courses in the School and University

The wider benefits, which included enhancing the online distance learning environment, are applicable to all forms of virtual learning. As the University shifts to an increasingly 'blended' learning approach, the lessons from this project could have a significant impact on our use of e-learning on Masters programmes' and with Distance Learners in general.

3. MSc Engineering Management

The MSc in Engineering Management is one of a number of programmes offered by the Advanced Manufacturing and Engineering Enterprise group (AMEE), within the School of Engineering and Design. It is a particularly popular course amongst engineering students and is gaining popularity for Distance Learners located both in the UK and abroad. As part of AMEE's group strategic plan for the next 5 years, there is a commitment to increase the numbers of students opting for e-learning, as well as enhancing the current e-learning environment of existing and new students.

The present e-learning set-up for this programme provides a tiny fraction of the benefits listed in this proposal. Benefits that many distance-learning students in other British universities have access to and regularly use. For example, the programme currently does not provide online and interactive discussion forums for students. This is an important component of the learning process in the programme. With a wide ranging student body in terms of culture and languages,

the lack of interactive discussion groups means the student is missing out on student and tutor support; the development of soft skills, sharing knowledge, group work etc.. Lacking also is the immediacy and convenience in the mode of delivery of teaching materials. With close to 200 Distance Learning students currently enrolled and numbers set to rise significantly, addressing these problems enhances the learning experience of current students, and ensures we remain competitive in the distance learning market.

To address these issues the authors piloted the use of a 3D virtual world environment. Many of the tools accessible in virtual worlds contribute directly to the learning process and experience. Since users 'log in' to the virtual world through the medium of an avatar, they can engage with each other and the tutors in 'real time'. Meetings can be arranged, lectures scheduled and, the virtual world environment can be designed for specific student needs. 'Tools' includes the use of 'real time voice', multi user presence, discussion boards, whiteboards, 'face to face' tutorials and 'real time' lectures and seminars. One of the unique contributions of this project has been to use some of these tools to make a contribution to learning, by providing the *social dimension to learning*. This is often absent from traditional approaches to e-learning.

4. New forms of communication

To suit the different needs of staff and students working in the 'non co-located' global environment with a variety of different time zones, we need to adopt different forms of communication and engagement. The overall project will evaluate the use of virtual world technology specifically for Brunel University, and the pilot study reported in this paper forms a part of this project. Virtual worlds allow users to combine textual chat with 'voice' and document display. Participants can see one another, have a common view of, for example, a PowerPoint slide, and can exchange opinions in real time in the virtual environment.

5. Student 'social interaction'

There is a growing consensus that the majority of the learning process is conducted outside the formal learning environment (Cross, 2006). Some accounts estimate that between 70% and 80% of learning is *informal*. Moreover it is the social dimension that enables informal learning. Examples of informal knowledge transfer include instant messaging, an exchange over the Internet, a phone call to someone who has information you need, or a meeting with your tutor. The project explores the use of technologies to facilitate social engagement as a learning tool. Virtual worlds provide an important social support role, especially for students who work at a distance (Thelwall 2008). It also enables the development of other skills, by allowing the student to work with other Distance Learning students on a

particular project (group work), to stimulate working, thinking and talking collaboratively; to process and embed language and curriculum learning; and to provide non-English-speaking students (a growing proportion on the programme), opportunities to practice their skills, in particular the use of the English language, through social networking activities (Reinhard et al 2003). Additionally, it is used to provide instant communication/feedback with tutors on assignments.

6. New methods of delivering materials

Currently the most common method of delivering materials to distance students is to make offline resources, (e.g. Power Point slides/hand outs), available online. This has major drawbacks for learning (Evans et al., 2004). One alternative is to develop specially designed open and flexible learning materials such as open e-learning books or multimedia lectures. The benefits to distance learning and overseas students are well documented (Evans & Fan, 2002; Moreno, Mayer, Spires, and Lester, 2001; Chan and Lee 2005, Lightbody, McCullagh and Hutchison 2006). Students with a suitable computer and internet connection, will be able to watch or listen to these, when and where they choose.

The MSc in Engineering management aims to have a strong practical focus, and solving problems based on real-life scenarios, forms a crucial part of the course. Engineering Masters Distance Learning students spend a great deal of their time in work, which can be based anywhere in the world, so it can be hard for the students to meet face-to-face with each other and with their tutors. The advantage of virtual world technology is that the course module content can feel more real. Students get a sense of being there together, and can engage in group work/simulations in real time. Additionally, this course would expect to set up collaborations with companies (warehousing, transportation etc.) to demonstrate logistics scenarios and exercises, such as role plays (leading to potential projects for the students to work on) so as to gain supply chain and other experiences.

7. Virtual worlds in Industry

Virtual world have been used by business and industry since early in the 21st century. Many companies have established their own individual virtual worlds for use by employees and stakeholders. Both IBM and Cisco have been leaders in this field and both report considerable savings by using the virtual world for conferences, seminars and training. The primary uses for this technology has been for meetings and other situations where the traditional face to face engagement has high costs attached (travel and time related expenses). In a report for GigaOM Pro, Kris Tuttle and Steve Waite say they will gain widespread corporate adoption as a platform for long-distance conferencing and training, job fairs, and other business uses in the years ahead. They state that 3-D virtual world applications for

enterprise use will grow into an industry earning \$8 billion to \$10 billion in annual revenue by 2014. Other uses include scenario training. For example the London Ambulance Service has used a virtual world to explore human reactions and responses to emergency situations, which would not be possible to enact in the real world ('dirty bomb detonation, multiple unit response to an extensive damage scenario (fire, flood, etc.)). As more potential for this technology are developed, we now see this medium being used for things such as 'walking through a human brain' or 'taking a walk on Mars' (The Economic Times, 2014).

8. Virtual world use within complex supply chains

Within many complex supply chains there are often non co-located contributors who have extensive knowledge of the area of the supply chain that they work within. Many of these contributors may be SME's or even single operators. This is the case in the Insurance industry, with many of the Claim Assessors managing a number of claims within a specific geographical 'area'. It is often hard for these contributors to meet on a regular basis, and much of the extensive knowledge held by these contributors may simply not be shared for this reason, or be lost, should the assessor leave the company. Sharing local knowledge, ideas etc could contribute greatly to developing best practice processes in claims assessment. Additionally, these contributors often feel quite isolated from the overall network. It is proposed that the use of a virtual world for meetings and other activities will increase engagement by these individuals and enable knowledge sharing between the individuals themselves and the insurer. An EU grant was applied for and obtained to use the knowledge gained from the Brunel University pilot studies to assess the potential application of virtual world use to a complex supply chain within the Insurance Industry.

9. Conclusion

The virtual Brunel project is an on-going Brunel University project. The pilot study discussed in this paper is one of several at Brunel University using this technology. Virtual worlds offer many benefits to educational establishments and have been used extensively by Universities and other teaching and learning institutions (Ishbel Duncan, Alan Miller, Shangyi Jiang 2012) with extremely positive results. The Brunel studies have, overall, also garnered a great deal of interest and support from both students and staff. Further work includes extending the platform for use by Brunel staff and students in the teaching and learning areas, and also to use this platform for research. In 2013 Dr Grant (PI) and Dr Gustafson-Pearce (CI) (and others) have been awarded an FP7 Marie Curie IAPP to design and develop a social network, for information sharing in supply chains. Many of the 'good practices' and lessons learnt in the pilot study outlined in this paper will be implemented for this project.

About the authors

Dr Susan Grant

Lecturer and Course Director for the MSc in Engineering Management Brunel University: School of Engineering and Design. In 2013, Dr Grant was awarded a FP7 Marie Curie IAPP to design and develop a social Supplier network – a social networking platform to enable knowledge sharing across organizations and their supply chains. In addition to the interactive social platform, the use of a virtual environment, as an environment whereby industrial players could collaborate, interact and share information informally and socially is introduced.

Dr Olinkha Gustafson-Pearce

Olinkha Gustafson-Pearce is module leader and lecturer in Graphic Communication. The focus of her research work is Information Architecture, with an emphasis on structure and navigation in Virtual Learning Environments, primarily virtual worlds. She is project leader of virtual Brunel, which is the Brunel University Web 3D site.

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