Online Simulation of Real Life Experiences; the Educational Potential

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Abstract: This paper outlines the Technology Enhanced Learning (TEL) strategy of the University of the West of England (UWE), UK, and demonstrates examples of simulations that use a mixture of web technologies, social networking and virtual worlds. In particular we discuss in detail a simulation that enables groups of law students to work as *partners* in simulated law practices in a virtual town that supports a range of casework. We also describe an accident investigation simulation built in the virtual world Second Life where groups of students can experience an accident scenario, investigate it, design safe systems of work to deal with the case and work collaboratively on accident analysis and prevention.

Introduction

The Technology Enhanced Learning (TEL) Strategy of the University of the West of England

The university's TEL Strategy currently focuses on four main aims, viz:

1. To develop effective methods by which the use of technology can be embedded into the curriculum.
2. To support and empower academic colleagues to take advantage of technology to stimulate and enhance the effectiveness of their teaching and to recognise the contribution technology can make to successful learning outcomes.
3. To ensure that the technical and organisational infrastructure supports staff and students in their use of e-learning technologies.
4. To ensure that TEL is integrated into strategic planning processes at all levels of decision-making in the university.

It is always undesirable to try to legislate specifically on the use of technology to enhance learning, as learning is such an individual, diverse and dynamic process. The university supports learning in a wide and varied range of subjects, professional disciplines and modes of study, and that variety is a real strength. The overall direction of the TEL Strategy is therefore to optimise the use of technology to enhance learning processes for all our students, whilst at least maintaining, or preferably increasing, the variety of approaches to teaching and learning. It is also important to stress that assessment and feedback are key elements in effective learning processes, and this strategy applies to the use of technology to enhance all forms of assessment and feedback.

The university has a significant number of students studying for entry into professions such as law, health practice, social care, planning, architecture, environmental studies and so on. The ability of emerging technologies to support the creation of realistic and effective simulations of real life experiences as aids to their learning, and as effective means of assessment, is a particular focus of this strategy. We are beginning to develop simulated experiences for

our students using a range of technologies, from traditional static web pages, through communication and social networking technologies and on to the use of 3D environments and virtual worlds. The two examples in this paper demonstrate the breadth of topics that can be covered and the range of approaches that can be used.

Transaction-based professional practice simulations

The real practice of any profession often does not follow a standard process. Professional practice is constantly faced by complex problems and indeterminate situations which practitioners have to unpick and define for themselves (Schön 1990). Theoretical knowledge learned at university is an important element of the professional curriculum, but students need to develop their understanding of the interplay between that knowledge, skills and values (Maughan & Webb 2005) in order to be fully equipped to deal with the reality of their future professions. Educational simulations enable students to experience and reflect critically on the problems and uncertainties of *real* professional practice. Educational simulations come in many forms, one of which involves inventing more or less complex scenarios and transactions for students to work with and learn from. The focus on transactions is deliberate as so much of real professional practice is transactional in its nature; whether the transactions deal with information, goods or services.

Educational simulations are not just about giving students a taste of practical experience. They can help to bridge the gap between the academic and the professional worlds by integrating skills, knowledge and values. Educational simulations give context and meaning to academic theory by enabling students to synthesise it with their own experience; it informs students' views of the *reality* of their profession (Frutos-Perez et al. 2009).

The use of educational simulations helps to consolidate and extend what is offered in the classroom in a number of ways:

- it allows students to put the theory they are learning into practice;
- it facilitates professional skills development;
- it is intrinsically interdisciplinary – *just like life itself*;
- it encourages collaborative working;
- it requires *deeper learning* to take place by way of reflection and critical analysis;
- it exposes students to the reality of professionalism and ethical behaviour; and
- it has a flavour of authenticity, particularly as it requires students to take risks, face the consequences of their actions and devise solutions to mitigate problems as they occur.

At the University of the West of England we are piloting the use of simulations in the legal education curriculum and augmenting this teaching and learning approach by the use of technology to support the transactional process that underpins it. We are currently piloting this approach in the Legal Process Course. It is a final year undergraduate course that takes 24 students each year. A series of around 25 weekly three-hour workshops are largely devoted to skills acquisition through practice and reflection. The casework is conducted outside class. After the first few weeks of the course we ask the students to form 'firms' of 4 for the first simulation – a civil case. We have 3 simulations – claimant/defendant actions – running in parallel, using the same case scenario. The firms are asked to take the case as far as negotiation and reach a settlement. The groups are then dissolved and students form new groups for the second simulation – a criminal case, where 3 groups work for the Crown Prosecution Service and 3 for the defence. The criminal case ends in a mock Crown Court before a judge and jury.

Paper-based simulations have the potential to be very wasteful. The casework described above generates a huge amount of paper, much of which is reproduced in triplicate, as 3 simulations operate in parallel. The casework model we use is fairly open-ended in that cases develop organically – each firm may go in any direction, change direction and may not even end up in the same place as another firm. Tutors invent and produce new characters as a case develops which won't necessarily be the same characters for all the cases. This adds to what is already a considerable amount of work for tutors in supervising all other aspects of the process. All these aspects can be greatly helped by the use of technology. We have developed SIMITA (SIMulations In Transactional Activities), an online Transactional Learning Environment that fosters team cohesion and interactivity, and that allows us to support the simulations efficiently. The system is built on a set of technologies that are already in place and well

supported at the university: Blackboard Academic Suite (virtual learning environment), Microsoft SharePoint (content and communication management platform) and Wimba Collaboration Suite (collaborative multimedia tools). Thus SIMITA is not a new system, but a new conceptual deployment of existing learning technologies. This development model offers significant advantages in terms of resourcing, reliability and flexibility, and has enabled us to develop the SIMITA platform very quickly and grow it dynamically following a learning design model. The design approach is purposefully student-centered, aimed at facilitating the experience of engaging with a simulation-based type of learning activity (for example, by devolving ownership and management of the virtual environment to students as much as possible).

SIMITA offers a location to store, generate, edit and update all the case documents and resources; also, quicker methods of communication between firms, firms and tutors, firms with their clients and other parties. Directories can be used to assemble all the personal information that is collected – this is particularly useful when new characters are created ad hoc. It also features a virtual town map that contextualises all the information that makes up the different cases that firms have to work on. Firms and individuals within them maintain activity logs and reflective logs online and can append other materials to their logs (e.g. assessment feedback). This 'virtual law office' also stores tutor and peer feedback on skills development. There are links to academic, legal and student-produced resources (e.g. student oral presentations, witness statements, etc.).

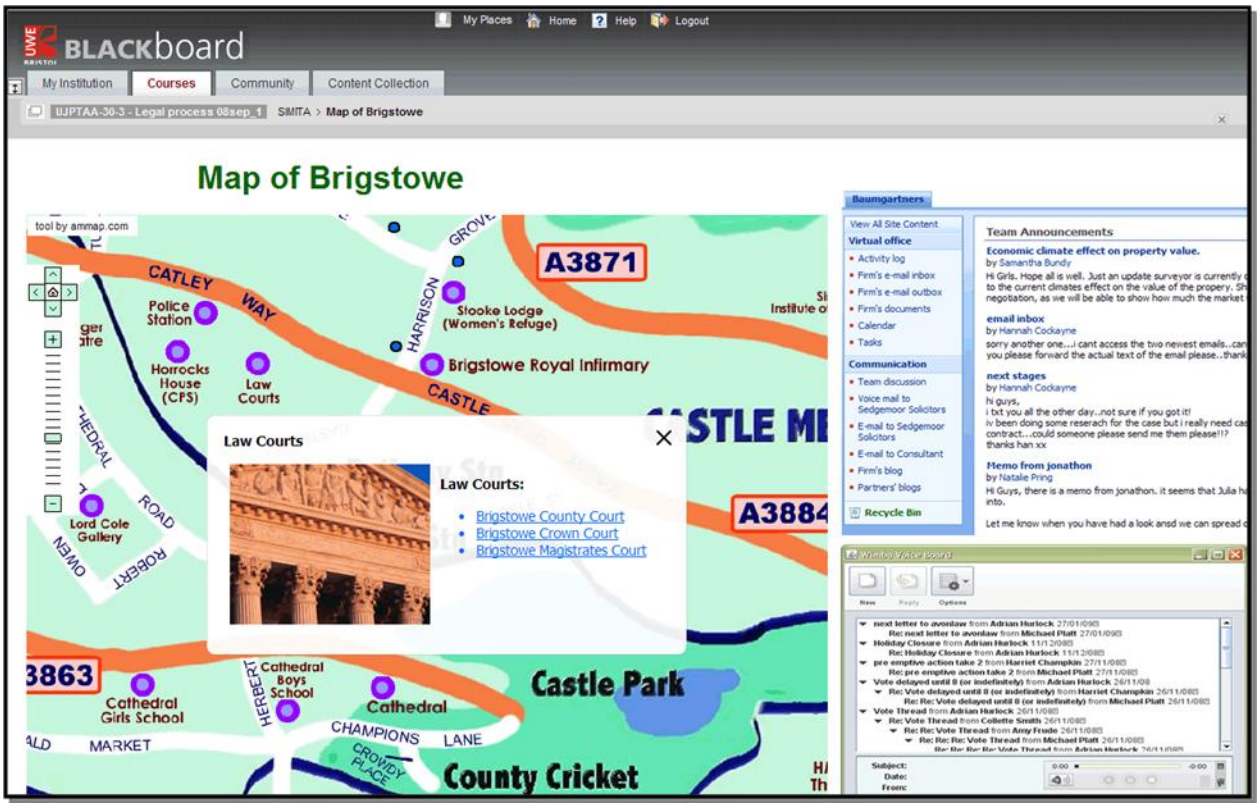

Figure 1: SIMITA platform showing the town map and parts of a students' virtual law firm.

In short, SIMITA gives students the opportunity to acquire and practise caseworking skills with the help of technology that behaves and feels exactly like that of a modern professional office. From the tutors' perspective, SIMITA offers the advantage of being able to monitor how groups are working much more easily than with paper-based transactions

Initial pilots of SIMITA have shown it to be easy and attractive to use. Students engage with it readily, enjoying the opportunity to make the space their own (for example, by being able to personalise their own firm's website and by being able to communicate with their partners using a social networking-type interface). They have also demonstrated a commitment and motivation to progressing the civil casework beyond what might have been

expected, given that this input and time is not directly linked to assessment. System statistics collected for the first pilot (24/11/2008-20/02/2008) show that the system received just over 4,000 hits during that period. Considering the small size of the group (24 students divided into 6 firms) and the non-assessed nature of the activities they carried out, one can infer that our current approach has the ability to motivate and engage students. The second pilot using the platform started on 23rd February 2009 with an assessed criminal case. The combined statistics for both pilots show that the system has received over 10,000 hits since 24th November 2008.

Further development plans for SIMITA include the automation of the process of setting up a simulation, so that the platform could eventually be rolled-out across the university and support skills development in a variety of areas of study. We are also considering a mixed-approach pilot where students will also interact in the virtual town while they are in the physical classroom. This would be achieved by using Tablet PCs so that students can take and exchange notes real-time and carry out some tutor-led group focussed activities.

Simulating events in virtual worlds

Experiencing real life events can be one of the most powerful promoters of learning (Kolb & Kolb 2005), particularly if those events are typical of the type that practitioners will be dealing with as part of their practice. But in many cases it is impossible, unethical or unsafe to expose students to these experiences. One example of this is accident analysis and investigation, a vital part of the work of environmental and occupational health professionals in the UK. In a traditional learning environment students can learn and practice the analysis techniques available to make sense of data collected during such investigations, but any analysis technique is only as effective as the quality of the data being analysed. Practising accident investigation and data gathering is a difficult experience to undertake for real, due to practical and ethical restrictions. Apart from anything else, accidents are generally fairly rare events, and so it is impossible to expose students to a range of real accident types during their study.

Second Life is a virtual world that enables users to experience events and communicate with others through avatars that can move through the 3D world. The world supports scripting that enables the creation of virtual structures and activities. The Educational Simulator System we have developed in Second Life enables predefined scenarios to run as interactive experiences which students can experience and collaborate upon together through their avatars. The simulator system consists of three components:

- The set, e.g. shops, houses, streets, factories (in our case Rushforth Road with a business park and residential home – see Figure 2)
- The scripted engine that runs the simulations, and
- The specific scenario in use.

The simulator can run a number of pre-defined simulations and there is significant scope for the generic engine to run simulations for a wide range of subjects in the future. The simulator has been built in collaboration with Citrus Virtual Ltd, our consultants and partners on the Second Life projects so far. The design and scripting of the simulator and the scripting of the set and scenario is carried out by Citrus Virtual, whilst the design of the scenario, the pedagogical design and the design of specific set elements are carried out by us at the university.

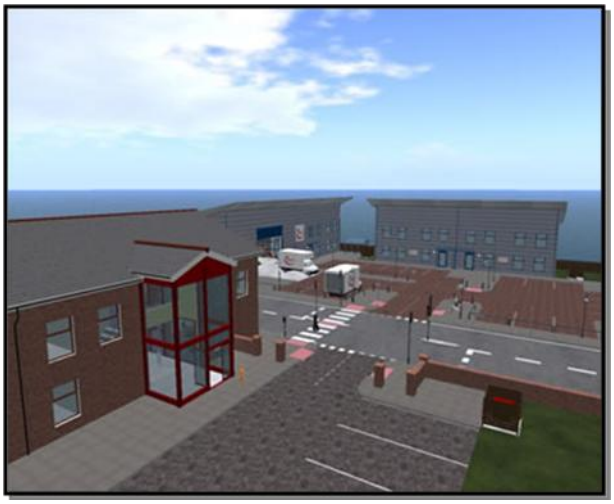

Figure 2: Business park and residential home

Figure 3: Inside the warehouse simulation

The first scenario we have developed is of a workplace accident in a warehouse environment (see Figure 3). The orange and yellow dummies are the players in the scenario. They have deliberately been made to look like brightly coloured crash test dummies to differentiate them from avatars that will be in the same environment and in close proximity. When students first enter the warehouse it is completely empty. The tutor who has control over the scenario can choose which scenario to run and then activate it. This activation populates the warehouse with the racking, trucks and other props, together with the dummy players. The scenario can be played in two ways; either as a complete run through "movie" that the students can watch from their avatar perspectives, or scene by scene, which allows the students and tutors to discuss critical causation points and analyse the anatomy of the accident.

The scenario has been through beta testing and will be piloted by a group of students this summer and incorporated into the MSc Environmental Health curriculum in the 2009/2010 academic year, using the Hewlett Packard tablet computers awarded to us in 2007 as part of their Technology for Teaching Higher Education Grant scheme. The pilot this summer is concentrating upon the two modes of use outlined above. In the first mode, the cohort of students will be split into witnesses and investigators. The investigators will be left in a holding area out of sight of the simulation and the witness group will teleport down to the warehouse with the tutor. The tutor will play the scenario through with the witnesses standing at a variety of points in the warehouse in order to see the event from different perspectives. Once the scenario has played through it will finish and the scene will switch to the end point, i.e. all the players disappear and the props and equipment are left as they finished up at the end of the accident. The investigator group now teleport down and begin their investigations. They can interview the witnesses, get information from some of the props and can also access documentary information, such as the safety policy and safety committee minutes from a filing cabinet in the first floor offices. It would also be possible to extend the scenario by having one of the students or a tutor play the role of the site manager, for example, who could then be interviewed by the investigators. The investigators then take the information they have gained and use an accident analysis technique, such as fault tree analysis, to create a picture of the accident. They can then revisit the simulator and the tutor can play the scenario through for this group, who can then compare and reflect upon their rendition of the accident against the actual event, creating valuable learning opportunities regarding accident investigation technique. The second mode of use is appropriate for students of accident causation and accident anatomy. In this case the whole group is shown the scenario scene by scene, and they are able to stop the scenario at critical causation points, discuss effective means of prevention and collaborate upon the design of safe systems of work to prevent accidents with the same underlying causation from occurring in the future.

The simulator has created a good deal of interest in the university amongst colleagues who teach a range of subjects. The latest application to be built is of a residential care home for the elderly, to enable students in Social Care to experience realistic scenarios in such an environment, and to investigate and collaborate upon such events. Our colleagues in Health Sciences are considering building a hospital environment that could enable students of different health disciplines to work together on an example case, and colleagues in mathematics have just begun to think about how mathematical concepts that can be difficult to comprehend could be made easier by visualising them in a 3D virtual world, e.g. set theory. As the sets are manipulated the underlying mathematics change, giving the students

a clearer understanding of what is happening in sets operating under different mathematical techniques such as probability and fuzzy logic.

Conclusion

The SIMITA and Second Life simulations are part of Simulations in Higher Education (SHE), a wide-ranging initiative of the E-learning Development Unit at the university, which aims to advance our understanding of the pedagogical potential of using learning simulations online and to develop good practice models for embedding such activities in the curriculum across the university.

In our experience, the use of technology-aided simulations in higher education has great potential to bridge the gap between theory and practice and to help with the development of professional skills. This potential has so far been largely unexploited. Evidence we have collected from our early pilots shows that this approach also enhances student engagement and motivation, thus improving the overall learning experience. We feel that we have only begun to understand the implications of this holistic approach to professional education, and that much more in-depth study and experimentation is needed to fully unpick its characteristics with a view to develop a reference framework of educational practice.

Acknowledgement and dedication

We would like to take this opportunity to acknowledge the contribution and enthusiasm for the simulation projects from our colleague, Deborah Street, who tragically died before this paper was written. Deborah was planning to collaborate with us on this paper, and the presentation at the conference, with regard to the potential for mathematics and statistics simulations. We greatly miss her involvement and tremendous professionalism, and it is with the fondest memories of a terrific colleague and good friend that we dedicate this paper to her memory.

We would like to thank Hewlett Packard for their support in enabling us to attend the conference and for their continued support and interest in our projects using tablet computers.

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Web Resources

Elearning Development Unit, University of the West of England http://www.uwe.ac.uk/elearning

Elearning at UWE Island, Second Life http://slurl.com/secondlife/Elearning%20at%20UWE/110/128/35

Second Life development blog http://researchobs2.edublogs.org