Contents

Simulations, learning and the metaverse: changing cultures in legal education

Paul Maharg
Glasgow Graduate School of Law
 paul.maharg@strath.ac.uk

Martin Owen
Independent Researcher
martinowen@mac.com

Underlying this move toward game-based learning environments is more than strategic opportunity or marketing; the shift toward games also represents an intellectual recognition among many that they represent experiential learning spaces, spaces where learners have rich, embodied, collaborative and cooperative interactions where they think with complex tools and resources in the service of complex problem-solving. (Squire 2005)

ABSTRACT

Simulation is one of the major applications of the web in entertainment and training, but has so far received little attention from HE and FE. It is becoming increasingly clear that simulations can be used for educational purposes, but how can they be used most effectively with students? How do they affect other areas of the legal curriculum? Can all professions use them equally effectively, and if so under which conditions? These and other questions are at centre of a two-year funded project, Transactional Learning Environment (TLE) 2.0, which sets out to create an environment, use it within variety of disciplines and sub-areas within law, and evaluate the results. This article describes the context of the project, sets out the ambitions of the project, and analyses the challenges facing it. It also sets the project within a larger technological context, and argues that such projects are essential not only for the future of legal education but for most professional disciplines in higher education.

KEYWORDS

Legal education; learning; assessment; simulations; games; constructivism; activity theory; situated learning.

1. INTRODUCTION

To anyone who uses the internet for more than booking plane flights there can be little doubt that there are many applications of the web that have the potential to enhance education (Bereiter 2002). One of these applications is simulation and the development of role-playing environments. There is a long history of these, in internet time, from the first early text-based instances of LAMBDA MOOs and MUDs through to the latest massively multi-user online role-playing games (MMORPGs) (Salen & Zimmerman 2004 & 2006; for a relatively early (and prescient) survey in law, see Aikenhead, Widdison & Allen 1999)[1]

In education, the debate has moved on from the fundamental question as to whether such environments can be usefully deployed with students, to questions such as how one might use them most effectively, how implementations can be managed, which types of simulations are useful, and how learning gain can be maximised in the mixed media environments of most HE programmes. In disciplines such as medicine, engineering, the natural sciences, military science, international relations, business process engineering, the use of sophisticated simulations is now well established, and a research literature spanning several decades has grown up that attempt to answer some of these questions (Satava 2001; Weller 2004; Rystedt & Lindwall 2004; Oswalt 1993; de Jong & van Joolingen 1998; Pidd 2002; Aldrich 2003). This article maps a number of research questions and describes one attempt to answer some of these questions, based on work that has been carried out at the Glasgow Graduate School of Law, University of Strathclyde.

2. APPROACHES TO SIMULATIONS

The term "simulation" has come to refer to a wide variety of forms of learning and activity. Definition is problematic, not least because the field is fast-moving and conceptions are being altered at fundamental levels by new technology and practice. A good example of this is the usual distinction that is made between symbolic and experiential simulations. Symbolic simulations "depict the characteristics of a particular population, system or process through symbols; and the user performs experiments with variables that are a part of the program's population."[2] An example of this is the use of simulation models in economics or in science discovery learning (Windschitl & Andre 1998). Experiential simulations are based upon case-studies or

1

2

3

scenarios, and include role-play and activity, often collaborative, in an authentic environment that in some way or other re-constructs aspects of real-life tasks. (Maharg 2006a) However as Barton & Maharg demonstrate, the distinctions between symbolic and experiential learning are breaking down, not only because new educational models are being used that employ both approaches, but because technology has advanced to the point where the two categories can be integrated in the same application (Barton & Maharg 2006).

There is a substantial body of educational research on simulations; and in general the early research on the effect of simulations upon learning did not present substantial advances in learning. While Ehman and Glenn (1987) reported gains in co-operative learning skills and positive affective outcomes in social sciences, the meta-analysis of Bangert-Drowns *et al* (1985) in the domain of science education reported that simulation-based learning did not result in cognitive gains. Further results in the domain of science-based discovery learning revealed the importance of context on learning gains. In one study, for instance, where students were given either an unsupported simulation or a tutorial, students performed worse on the unsupported simulation (Rieber & Parmley, 1995).

4

What counts as the measure of better or worse performance in a study is, of course, crucial. Some researchers have concluded that simulation learning is best deployed when learners require to learn procedures - for example, the process of successful experimentation in the field of scientific discovery learning. They point to the difference between results for procedural knowledge, and those for conceptual learning, where simulations appear to be less effective in enabling conceptual learning (eg Mandl, Gruber & Renkl, 1994). However other researchers argue that simulation learning, particularly if it is structured rather than left as a pure simulation, can enable learners to understand and transfer concepts more effectively than the usual instructional tools associated with a traditional curriculum. According to Thomas & Hooper (1991), for instance, the effectiveness of learning by simulations is best measured using "application and transfer" assessments. Their view was substantiated by other studies, for example that of Shute and Glaser (1990) where learning undertaken within the simulation was compared with learning undertaken in a more formal academic setting, and no significant difference was detected. The evaluative measure used in this study was rehearsal of conceptual learning. Such relatively simple performative measures are of course a function of the type of educational research design where confounding factors that may skew results are eliminated or avoided.

5

However simulations tend to be affected by many different factors in the curriculum (Barton, McKellar, Maharg 2000); and often the reasons for their success or failure lie less in the internal structure or effectiveness of the simulation as a learning tool and more in the perceptual and situated factors that contextualise an innovation. While it is useful to understand the implications of the results arising from the body of experimental educational research, it is also important to design an evaluation framework that can take a holistic view of the contextual factors affecting implementation of simulations and the learning arising from them, and a more holistic view of performative measures of achievement. We would therefore go beyond the "application & transfer" approach of Thomas & Hooper to investigate ways of creating a more complex evaluative ecology. We shall describe this in more detail later in the article.

6

This point, though, raises deeper issues of research bias and assumption. Simulation may be one of the new emergent forms of pedagogy that has the capacity to transform the HE curriculum. If this is the case, we need to ensure that our research methodologies do not make assumptions about educational concept and context that would lead us to misinterpret or misrepresent the real innovation of the approach. As Shaffer & Squire point out in a subtle article on how forms of research can innately bias the conceptualisation of innovation, we need ethnographic and phenomenographical studies of learning in context in order to analyse, conceptualise and construct truly innovative educational designs in FE and HE (Shaffer & Squire 2006; see also Francis, 2006; Squire, 2003). How we propose to do this is set out below in the section on evaluation.

7

3. SIMULATIONS IN THE GGSL, 2000-2006
BACKGROUND & THEORY

Before we describe the simulation environment we are constructing (TLE 2.0SIMPLE), together with its output and our approaches to evaluation, it would be helpful to describe the simulation projects already in use in the GGSL and the context of their development. The simulations we have developed over the past 6 years are the product of a number of factors: the type of course we are involved in and its prescribed curriculum; the aims of the course; and the research literature in a number of different areas of educational and ICT research.

8

The type of course we designed for was a crucial element of the design process. The DLP performs the same function as the Law Society of England and Wales" Legal Practice Course, in that it is a primary professional legal education course, the content and structure of which is prescribed by the Law Society of Scotland, with its principal aim being to prepare students for traineeship with legal service employers. There are a number of differences between the two courses: the curriculum subject arrangement is significantly different in some respects; the course is slightly shorter than the LPC; to date, providers have been given much more latitude in their interpretation of the Society"s course design, and the course is largely taught and assessed by tutor-

9

practitioners. At the GGSL there are approximately 150 practitioner-tutors, with four Visiting Professors. It is designed and evaluated by three full-time academic staff with a complement of administrative and IT staff. Approximately 280300 students will entered the course in 2006/7, arriving largely from either Glasgow or Strathclyde Law Schools, but also including a small number from other law schools in Scotland, eg Aberdeen, Edinburgh, Glasgow Caledonian, etc.

As we shall see, these differences are important and have affected the design and implementation of the simulations. But our simulations were also influenced by the broad aim of the course, which is in effect the aim of all such courses, namely to prepare students for their two-year traineeship. To do this we need to take into account the knowledge and skills students have already learned on their LLB courses (with the variation between university law schools that this entails), the prescribed content and structure of the Diploma"s programme, our own strengths and weaknesses as a provider, and our own interpretation of what a professional course should entail.

10

Throughout the development of the simulations over the last six years we have drawn upon the research findings from a number of interdisciplinary educational research directions, which collectively might be known as the Social Learning paradigms. Social learning research takes as its principal position the concept that cognition is inextricably bound to the social and to the material world. In what constitutes a fairly massive body of research it derives its foundational texts from sociocultural theory (Vygotsky 1978; Leontiev 1981), from situated learning theory (Greeno & Moore 1993; Greeno, Collins & Resnick 1996; Suchmann 1987; Lave & Wenger 1990, Wenger 1998), from strands of phenomenographical theory (Marton & Booth 1997; Laurillard 2005), from ethnomethodological theory (Garfinkel 2001), activity theory (Engerström 1987), distributed cognition (Hutchins 1995), and discourse theory (Kress & Leeuwen 2001; Gee 2003)

11

Such a body of work may seem to be impossibly diverse, and indeed when read closely and antithetically there are many contradictions between the different approaches. But what they do focus on is the relationship between the individual and the social context around him or her. They thus eschew the black box approach to cognitive development and analyse how knowledge is created by meta-webs of social context and artefacts, by attitudes, prior knowledge, expectations, as well as by formal statements of cognition. As Lucy Suchmann puts it, describing ethnomethodological approaches to the analysis of learning, "[t]he notion that we act in response to an objectively given social world is replaced by the assumption that our everyday social practices render the world publicly available and mutually intelligible" (1987, 57).

12

Given this approach, it comes as no surprise that we were drawn to forms of social and collaborative learning within particular simulation environments. The important - though by no means the only -- questions we have addressed include the following:

13

- What are the relationships between academic and professional learning, and how can we help students negotiate that passage most effectively?

- What are the routine social practices that can help students engage in effective professional learning?

- If we expect students to collaborate in learning on a professional basis, what is the constructivist basis of that engagement? What are the drivers and blockers to successful learning in this network of relationships?

- The DLP is a time of changing identities, as our learners move from being students to becoming legal professionals. What does this metamorphosis entail and how can we best facilitate this process?

Throughout, we have been concerned to track the expressive immediacy of experience within the curriculum, not just our own or students" but also our tutors as well. The curriculum functions as a holistic, dynamic continuum, and alteration of a sub-system of it to change one experiential issue inevitably ripples to alter other experiences.

14

Over time we have developed an approach to professional education which we have called transactional learning.[3] The phrase has many meanings, but for us the following have become guiding principles for our practice:

15

Transactional learning is active learning.

Transactional learning is active learning, not passive. In that sense, we want students to be involved in activities within legal actions, rather than standing back from the actions and merely learning about them. There is, of course, a place for learning about legal actions; and transactional learning is rarely possible unless students first have a conceptual understanding of what the process actually entails. However, transactional learning goes beyond learning *about* legal actions to learning *from* legal actions. Indeed there may be some

16

forms of learning that can only take place if students go through the process of carrying out a transaction.

Learning to do legal transactions.

As befits the type of learning that students do in a professional legal course, we aim to give them experience of legal transactions. In addition to learning about how property might be transferred, students also take part in the transaction. They thus learn considerably about the transaction itself. This learning extends not only to a knowledge of parts of the transaction, but of the whole transaction. 17

Transaction + reflection.

Transactional learning involves thinking about transaction - indeed (to go back to the root of the word) thinking *across* transactions. It includes the ability to rise above detail, and "helicopter" above a transaction; or the ability to disengage oneself from potentially damaging views of the group process, and re-construct that view. It means that students need to be encouraged to adopt the habit of documenting firm transactions using instruments that are focused and private to the firm and their Practice Management tutor/consultant. Reflection, even in a group, is an intensely private event, and its products require careful handling in the public space of the curriculum if the process is not to be fatally inhibited. 18

Collaborative learning.

Transaction as collaboration, indicating the root of the word: literally "acting across". Students are valuable resources for each other, and it might be said that universities still do not recognise this sufficiently or harness the power of this form of learning to enhance student learning. Collaborative learning breaks down the isolation and alienation of what might be regarded as isolated or cellular learning. There is of course a place for individual learning, silent study, and the like. But students can help each other enormously to understand legal concepts and procedures by discussing issues, reviewing actions in a group, giving peer feedback on work undertaken in the group, and so on. And perhaps what is even more important is that they begin to trust each other to carry out work that is important (there is assessment value to all our online projects, and many students have clauses in their traineeship contracts that insist they pass their assessments at first diet). In other words, students begin to learn how to leverage knowledge amongst themselves, and to trust each other"s developing professionality (learning about know-who, know-why, as well as know-what within the firm). Often, we have found, if there are firms that are not producing good work or keeping to deadlines, it is because they do not know how to work together effectively; and this often arises from a lack of trust (Barton & Westwood 2006). 19

Holistic process learning.

Transactional learning ought to be based on holistic and process learning, *ie* learning from legal processes. In undergraduate seminars and lectures and in their reading of texts, students engage with ideas, and form understandings of legal concepts. They link up emerging understandings with their prior knowledge, and with their anticipation of future knowledge, and the more they become familiar with the discipline, the easier and more efficient this learning process becomes. 20

While the process of chunking knowledge and linking chunks is often sufficient for undergraduate study of law, in the early years at least, it is not sufficient for professional students. In their traineeship, the students will be asked to undertake tasks that demand a more holistic understanding of legal process and legal procedure. In this sense, students need to arrive in their traineeship not only with a sufficient knowledge of the parts of a transaction - which letter is sent to whom, what it should contain, for instance - but also a holistic knowledge of the whole transaction. When they are given a file-in-progress in the office, for instance, they need to be able to move from part to whole, and vice versa, in order to identify what has been done and what needs done. This process is difficult for trainees precisely because they are unsure of the whole transaction. It therefore makes sense to give them as much practice as possible in carrying out whole-to-part and part-to-whole thinking. 21

Ethical and professional learning.

Transactional learning of necessity draws upon ethical learning and professional standards. In both undergraduate and postgraduate seminars and lectures and in their reading of texts, students engage with ideas, and form understandings of ethical and professional concepts. Within transactions they practise and link up emerging understandings with prior knowledge, and with anticipation of future knowledge within the dynamic of the transaction. 22

LEARNING PROJECTS

How did we put these principles into practice in the GGSL? When we started in 2000, there were no simulation 23

engines available that could be usefully embedded within a web context. We also needed to start with what we thought would work with our tutors. Our objective on building the simulation environment was to attempt to create a sense of a legal office, within a fairly recognisable west-coast Scottish town. We began in 2000 with an application built in ColdFusion which created a communication system based on webforms, to enable contact between student firms and between the firms and fictional characters played by postgraduate students.

The first project around which the environment was constructed was the Personal Injury Negotiation project (Maharg 2001; 2002), which was first implemented in 1999. This had been created three years earlier at another university as a simple email negotiation between teams of students. There were no realia, no virtual community tools, and there was no web-based functionality. In 1999 the first sense of an online space given to students was a webpage consisting of photo-montage, later developed as a rather crude schematic map with no interactive features. That year we also created fifty document sets, based around the same basic scenario, but differing in key details such as type of injury, wages details, names and addresses, etc. These document details were labelled as variables within a database of all available documents.   24

The next year, 2000-2001, we brought a second subject into the environment, namely Private Client. Two years later a third project, namely Conveyancing, in which students buy and sell domestic property over the web, was added to the environment, and later the Virtual Court Action. Others projects are planned, eg setting up and winding down a "shelf" company in Company & Commerciall (setting up and winding down a "shelf" company).   25

The different transactional simulations are not identical, any more than actual transactions are similar. We categorise our transactions according to a 3D field stretching from highly " open-field" to highly "bounded" (Barton & Maharg 2006), and where there is a relative depth of field according to the existence and clustering of resources within the environment. Personal Injury is highly open-field, in that the transaction is ill-structured and relies on real-time correspondence between students and postgraduate mentors who play the parts of characters, institutions, etc. Conveyancing, on the other hand, is highly bounded, with forms and documents that are procedural and formal in their content.   26

The work that students undertake is intensely collaborative. To ensure that work is genuinely collaborative we have adopted the some of the work practices within law firms to signal responsibility for individual work within a team. Under the subject of Practice Management we require students to fill out an Activity Log every time they perform firm work. This entails logging an activity title, date, time span, and short description of the work done. This log is available to other students. Students also have a Personal Log, which is private to an individual student and his or her Practice Manager - the practitioner-tutor who is assigned to the firm - and in which students can comment on their own work, as well as their perceptions, feelings, etc. The subject is assessed by a 1500-word reflective report, which is of course based on the work described in the Activity and Personal Logs. The Practice Manager occupies an important position - encourager, adviser and authority figure - and is trained in coaching techniques to ensure that students work effectively as a team and individually within the simulations. We have found that with the in-depth collaboration we expect of students on the course, the presence of a mentor/authority figure was essential.   27

As the projects increased in number and complexity, we assembled a sense of place built around the original, very simple schematic town map. The following year (2000-01), the map was redrawn so that it was graphically more sophisticated, and included website links built into it (Figure 1). These resources were gradually increased, and in 2001-02 a directory was added as the number of characters, businesses and institutions grew in size (Figure 2). Currently, the map exists as a Flash application, zoomable, with many small photographs attached to streets to give a sense of an actual place. The virtual office has similarly been developed incrementally. The first year of operation (1999-2000), it was little more than an email address. The next year we used Outlook to develop a more sophisticated environment (the application was used at that time by a number of larger Scottish law firms as the interface to their office systems); and later still we built a truly web-based application in Visual Basic and other applications. Several years ago the office environment was re-designed around MS SharePoint Team Services amongst other applications, with a greater range of collaborative learning tools - task organiser, calendar, firm minutes, confidential logs, discussion forums and alerting services.   28
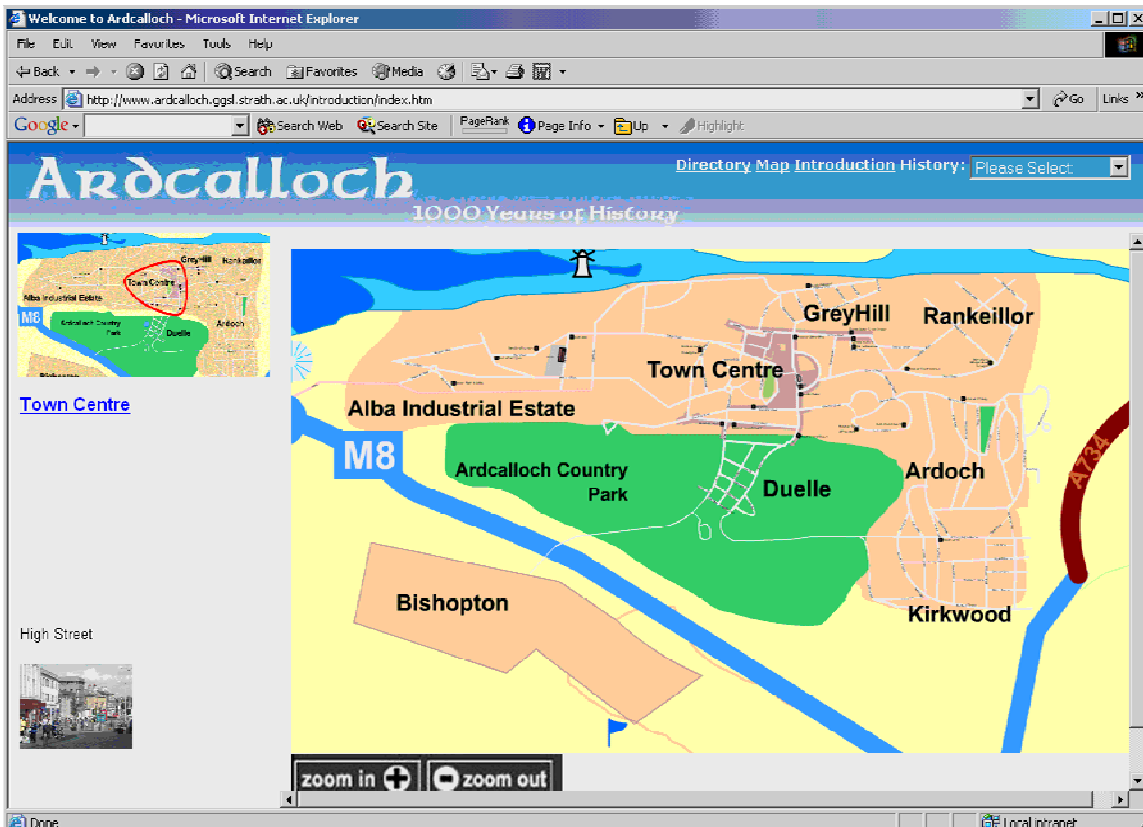
Figure 1: map of Ardcalloch

As the number of websites grew, it became important to manage their development as mini-projects, and to consider the interface with users of the virtual environment. It was not possible for us to create a generic web template for our town sites. In reality, commercial and institutional website design is really only limited by the funds available, the creative flair and, it might be added, the bad taste of the designers. It was necessary for us to create sites that gave a presence of a business or an institution to the viewer, without importing into the site all the actual functionality of a real commercial site; and so many of our sites are simple "brochure" sites. Some have more extensive and complex text than others - in part this is due to the nature of the site (for example the web pages of Global, an international conglomerate, is much more highly structured and polished than the single page for Rigley"s Newsagent shop). In part it is due to the enthusiasm of particular designers, and we were happy to give them relatively free rein on this. After all, if the websites in the town all had a similar look and feel, or simply dealt with matters relating to the projects, there would be no sense of realia, of the sheer randomness of reality, about the town.
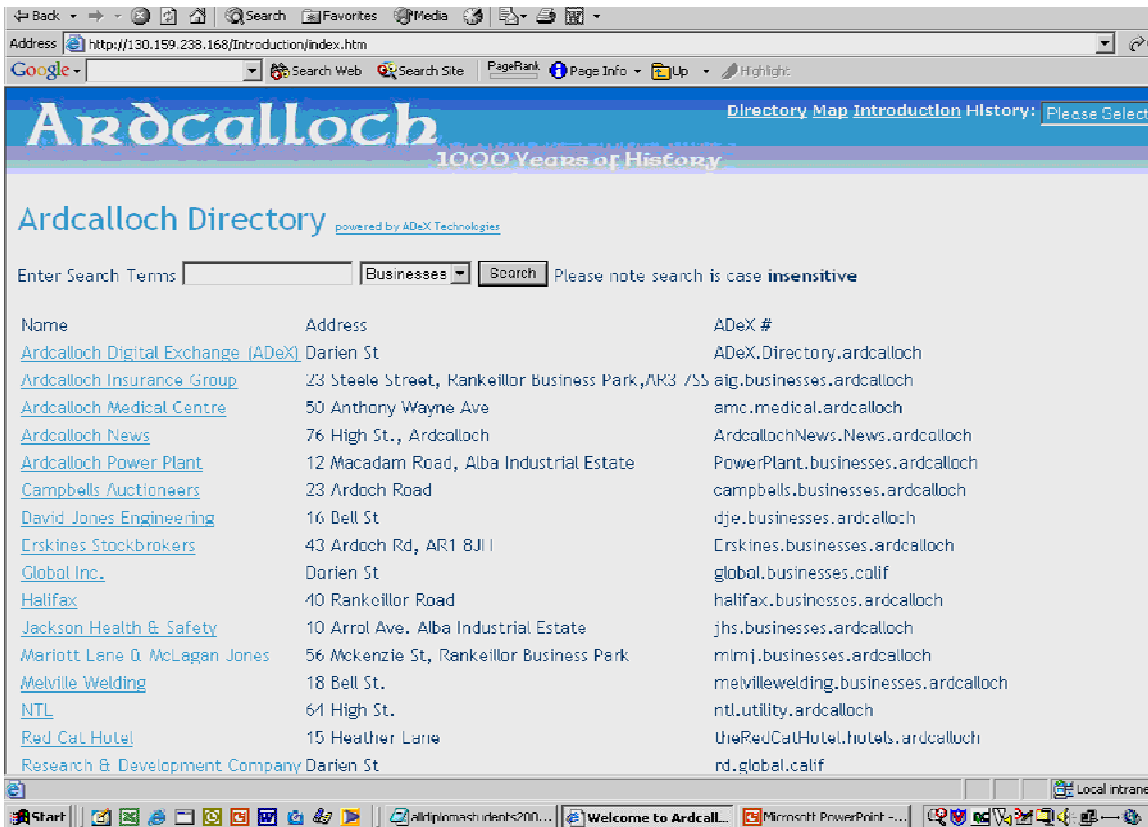
29

Figure 2: Ardcalloch directory

With projects increasing in number and complexity, the directory became more important as a way of navigating information within the town. The first directory was relatively crude in design, but the following year we devoted considerable efforts to creating a substantial directory sub-divided into categories - institutions, businesses, law firms, citizens. "Law firms" was an anomalous category because it was so specific, but it was necessary to create it because students would want to check this list most frequently, and because of the number of law firms within the town. The sheer number of law firms within the town was the subject of comment in the *Ardcalloch News*, an online newspaper (written by students), who noted in a weekly column that there were more lawyers than nurses in Ardcalloch, and wondered whether this development was good for society.   30

Working within an online simulation environment affects attitudes not only towards IT but also towards how it can be used within a legal office practice. One of the issues we were concerned about was that of security - not the security of our own systems, which was an altogether different matter, involving university and departmental systems, but those affecting legal practice. Communications security and secure encryption over the internet remains a serious issue for lawyers, and we needed to alert students to this in our online environment. We did so with the introduction of a fiction, namely "AdeX" - Ardcalloch Digital Exchange. We informed the firms that under a Scottish Enterprise scheme to develop local broadband culture and communications, Ardcalloch had won a grant to install and use a wide-area broadband which also included secure digital communications systems. Lawyers could thus communicate with each other and with everyone else within Ardcalloch the need for third-party applications or delivery methods. The fiction raised the issue of internet security to students without actually inhibiting communications in the projects.   31

Photographs, attached to streets, give a visual sense of place to the town (see Figure 1, bottom left-hand corner). This is important for the long-term development of the project in a number of ways. First, the town becomes recognisable a west of Scotland provincial town, perhaps around the size of Ayr, and very much smaller than Glasgow. Indeed, many of the photographs were taken in similar towns such as Port Glasgow, Greenock, Paisley, and were added to the map. Second, if the town is to be used by other disciplines within the university such as architecture, the built environment, planning, urban studies, social work and the like (more of this below), then the representation of place becomes important for their students. Thirdly, the map photos help to give a sense of "distributed identity" to the various districts within the town (described below).   32

This sense of locale is also present in the history of the town (Figure 3). We wrote a brief historical essay on the town, available on the website by historical period, that describes the town's place in Scottish history and particularly in Scottish legal history. The history is also linked to the websites in the town that students can access. For instance, there is a Faculty of Procurators (historically a professional grouping of lawyers within a   33

locality in Scotland), and their website describes their development within Ardcalloch, relations with their sister Faculty in Glasgow, and their place within local legal culture. The town"s development as an urban centre is described in detail. The centre, for example, is the old medieval heart of the town. To the north-east lies Greyhill with its jetties and small docks developed in the nineteenth century, and the slum housing associated with this area (currently being redeveloped as a "Silicon Dock"). Further east is Rankeillor, with its lines of modest tenemental housing. South of this lies the unique architectural development of Ardoch, designed by the Scottish planner and visionary Patrick Geddes, as a response to the problems of slum housing that were developing in Greyhill in the early twentieth century. Further south lie the middle-class suburbs of Kirkwood, while expensive housing is situated in Duelle, in Ardcalloch Park. To the west lie the new developments of the Alba Industrial Estate, a late-twentieth century solution to the problems of local unemployment.

Figure 3: history of Ardcalloch. The drop-down box, top-right, gives access to seven different periods from early medieval origins (extract shown above) to the twenty-first century.

The simulation environment is therefore a "thin" space, where fictions and historical facts meet, and which, like dramatic and theaturgical spaces, can be used for the representation of reality. However, the actual cultural development of any place also displays discontinuities and ruptures. The creation of a fiction enables us to focus on aspects of society and culture in decline, and the local response to that, and to deploy these as an integral part of transactional learning. On the Professional Competence Course (PCC), for instance, we use the virtual community to enable us to target specific sectors of the economy and local economic patterns that we want to use for teaching purposes. In the PCC we use a fictional multinational company called Global. This company, with headquarters in California (AdeX ID: http://www.global.businesses.calif/), entered the Scottish economy in the wave of NASDAQ confidence in the mid-nineties, to produce products for the European market, and to take advantage of local R&D expertise in the universities in Glasgow as well as government and EC grants. The global downturn has required them to withdraw from Ardcalloch, and this has created a range of legal problems, which form the basis of many of the modules within the course. Some of these problems are the focus of several modules, so that trainees are able to work on the same legal problem from a variety of different perspectives. The problems, and the general economic background to the firm, are described in two articles in the media centre on the company"s website. 34

The simulation space can also be used as a representational space for the micro-detail of professional practice. The students" virtual offices have similarly been developed incrementally with the space of Ardcalloch (Figure 4). The first year of operation, they were little more than email addresses. The next year we used Outlook to develop a more sophisticated environment (the application was used at that time by a number of larger Scottish law firms as the interface to their office systems); and later still we built a truly web-based 35
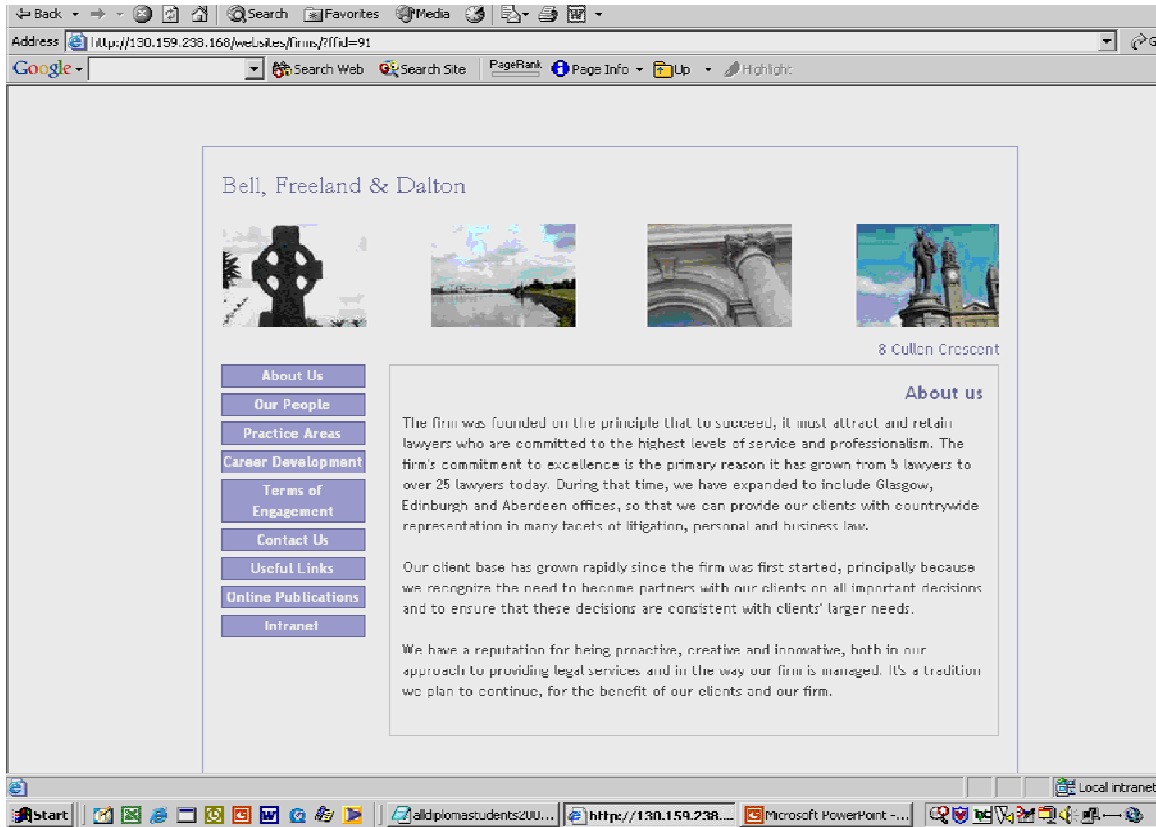
application (Figure 5).

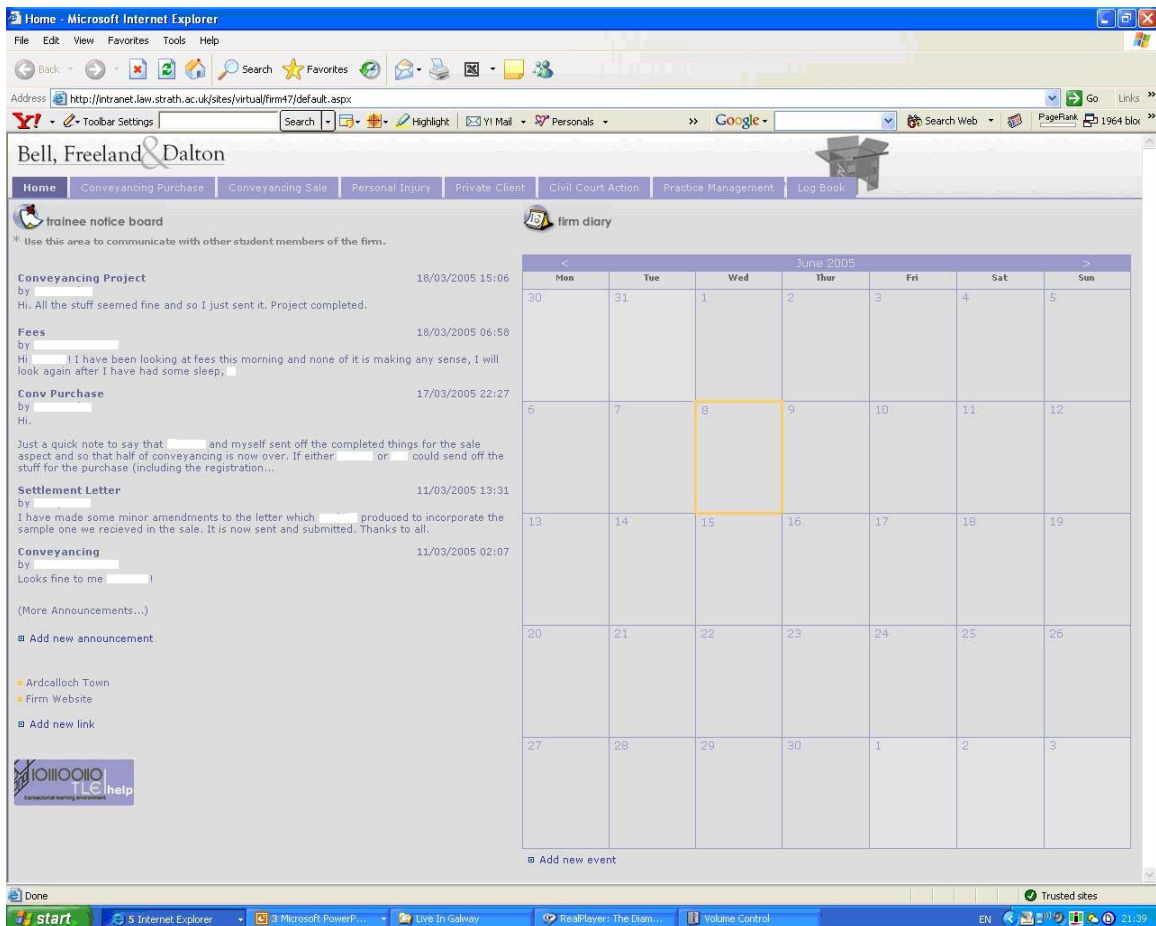Figure 4: public-facing front page of a student law firm

Figure 5: Student law firm intranet home page (names blanked to protect privacy). Note the links to the transactional pages under the firm name strapline; and the discussion forum and calendar & task tools.

In summary, therefore, our simulations site learners in a professional context, where there are aggregates of transactions, perhaps multiple solution paths, and where learners" work is, as it will be in the workplace, distributed between tools, colleagues, resources, anticipated and unanticipated problems and individual constructions of knowledge and experience. Such simulations are powerful learning tools: year on year the feedback from students has proven that beyond doubt. We now want to generalise that success to other professions, other departments and schools. Our virtual town is both a generic background to transactions and can provide the realia that is an essential element of a professional transaction. In that sense it can be used by engineers, architects, social workers, health workers, surveyors, accountants - in short, any profession that deals with client or patient. To enable this to happen we need to develop the tools that will enable the professional cohorts in Higher and Further Education to develop links and liaisons with each other, and to practise the collegiality, networking, values-building and community-building within and between professions that exists within actual workplaces.   36

We also require to evaluate the use of the wider use of this transactional learning environment, analysing in particular the effect on the teaching, learning and assessment processes and the associated organisational issues that arise from this. To date, there has been no measured comparative study of the effects of such an environment in law. There are many more evaluative studies in other disciplines, particularly in the scientific domain. Barton & Maharg (2006) conducted a study of the meta-research on the subject, and compared the results to TLE 1.0. But precisely because TLE 1.0 is a learning as well as an assessment environment, it is difficult to compare the processes of teaching, learning and assessment in TLE 1.0 to more conventional approaches - particularly as the entire transactional application suite is used not in laboratory conditions. The comparison is made more difficult because there is no clear set of outcomes or standards for the Diploma programmes in Scotland. There is anecdotal evidence that students who undertake this approach are better equipped to understand the nature and context of legal transactions in their traineeship. Internal feedback proves that the approach is useful in helping students understand and practise client-based transactional learning. But while But while we consider that TLE 1.0 has succeeded as a learning environment within the GGSL, the nature of its construction, based upon disparate elements of proprietary software, has made it difficult for other institutions to use the approach in their own programmes of study or to liaise with us other institutionsin projects in such project learning. Consequently it has been difficult to form inter-institutional and interdisciplinary projects.   37

As it stands, then, TLE 1.0 represents the first iteration of our strategy to transform the nature and effectiveness of professional learning. It is so for a number of reasons. It enables problem definition to begin with construction of the problem space. It can support what we call open-field problems (where learners construct their own solutions or transactions), or bounded-field problems (where learners follow strongly pre-set procedures and transactions). Above all, it can be used to generate problems and problem-based scenarios that are clear and clearly defined, or are deliberately defined as having fuzzy goals or unstated constraints; that possess multiple solutions, solution paths, or no solutions at all (no consensual agreement on the appropriate solution); and that enhance reflection and collaboration. They increase the range of teaching and assessment alternatives. They are close to the world of practice but safe from the possible realities of negligent misrepresentation; they can enable collaboration; and students begin to **see** the potential for the C in ICT, and that technology is not merely a matter of word-processed essays & quizzes, but a form of learning that can changequite fundamentally what and how they learn.   38

Almost all of the above points are also strong arguments for simulation to be used in the undergraduate academic curriculum. Simulation and clinic approaches to learning, we would contend, enable transfer of knowledge from undergraduate to postgraduate professional programmes; they help students cope with identity change at a particularly vulnerable point in their educational career; and they can be the focus for development of moral and ethical attributes. This is scarcely a novel idea - after all, the literature from medical education has proven that problem-based learning is a powerful heuristic in undergraduate education, and transactional learning has the potential to be used in undergraduate programmes as well as in professional programmes. The "thin" space of simulation is adaptable to most stages of tertiary education.   39

4. TRANSACTIONAL LEARNING ENVIRONMENT (TLE) 2.0SIMPLE: SIMULATED PROFESSIONAL LEARNING.

In 2005 a consortium of Futurelab, University of Strathclyde (GGSL) and UK Centre for Legal Education (UKCLE) successfully bid for JISC project funding under its Large-scale Implementation of Innovative Technologies call, part of the JISC Innovation strand.[4] The consortium project is in effect the creation of the second iteration of an environment for professional learning - an open-source, open-standards transactional learning environment (TLE 2.0SIMPLE) - and will engage in large-scale evaluation of the implementation of this environment. In the process we shall use the innovative gaming technologies developed by our project partner, Futurelab, together with their experience in design and evaluation.   40

It will be specified according to the requirements of a representative grouping of professions, and the functional specification, to be drawn up in the first six months of the project, will be implemented as a fully-functional platform and tested in the following twelve months of the project with our project case study sites, where it will be used within professional programmes in the last six months of the two-year project. This platform will deliver the transactions. There will be a suite of tools which will allow the creation of transactional content by academics and professionals. Within the project we shall evaluate the educational value of these projects in a series of use case pilot studies. The studies will be carried out with staff from our institutional case study sites -- effectively professional groupings within the three Faculties of Engineering, Education, and Law, Arts & Social Sciences in Strathclyde University. These are the Dept of Architecture (BSc Architectural Studies, in particular the Postgraduate Diploma in Architectural Design, and the Design Management and Practice courses - these courses already have a strong interest in online learning); Glasgow School of Social Work (MA Hons in Social Work); and the Diploma in Legal Practice, Glasgow Graduate School of Law. We shall also be carrying out identical studies within a single profession, namely law. In association with UKCLE we have identified three law schools prepared and ready to host a case study, and work with them to embed TLE 2.0SIMPLE in at least one module. University of Glamorgan Law School will be using the environment within a first year Tort module; University of the West of England will be using it in a civil case (negotiated divorce) and criminal case, while Warwick Law School will be deploying it within their undergraduate Legal Practice module. In addition we shall design and implement a mobile learning project within the larger TLE 2.0SIMPLE project. We shall be purchasing 16 laptops on which we shall load the project software, and track mobile collaborative learning in the use of TLE 2.0SIMPLE by students in the simulations.

41

Our pedagogical approach is constructivist in nature, and situates learning tasks as far as possible within authentic professional environments. Given our approach, our educational challenge is this: how can simulations effectively enhance professional learning across a range of professions? The project aims to answer this question in substantial detail, and is designed around five phases and a three-year trajectory thereafter (see Appendix 1 for a statement of these phases, together with a list of project outputs and outcomes). Critical success factors include the following:

42

enhancement of student learning,

user-friendly, interoperable, accessible and scaleable applications and tools for academic and administrative staff

embedding of professional learning within academic learning

5. ISSUES ARISING FROM TLE 2.0SIMPLE WORKSHOP 1

Our first project workshop was held in June 2006 at Ross Priory, a university retreat house by Loch Lomond.[5] During one and a half days we aimed to

43

> Get to know each other as project partners

> Learn in detail what TLE 1.0 actually did, eg

> how it was organised

> how it was used in the curriculum

> how students learned using the environment

> feedback from students

> Be aware of the types of the possible features of TLE 2.0SIMPLE

> Learn about other disciplines" or other departments" project plans

> Further develop their interdisciplinary projects

> Begin to design the features of their own projects

> Discuss the implementation and evaluative aspects of their project

> Know the roadmap for the project

The workshop consisted of presentations and small group work, where project partners began to define their projects according to the template provided by GGSL.[6] The workshop was very valuable for the impetus that it

44

gave the project, A number of themes emerged that were important to the rest of the project, and they are outlined below.

5.1 UNDERSTANDING THE TEACHING OF PROFESSIONALISM THROUGH TASKING STUDENTS

In examining the work of professionals it is clear that real professional life is about integration of knowledge into contexts which are changing continuously. That knowledge becomes valuable when it is contextualised in the narratives of professional experience.

45

There is a considerable difference in emphasis in the notion and techniques required for professional development as compared to a technical approach to training. Professional education requires judgement rather than simple answers. This has been well articulated by Bevis & Watson (1990), who compared a technical model against a professional model for clinical nurse education (Table 1 below).

46

Technical Model	**Professional Model**
The only learning worth evaluating can be seen as behavioural changes.	Worthwhile learning is often personal, obscure and private. Only some learning appears as behavioural changes.
Everything that exists, exists in some quantity, and therefore can be counted and measured.	Many things that exist are note externally verifiable.
The teacher-selected goals are the important ones, therefore the evaluated ones. Both teacher and student selected Important, therefore the evaluates ones	Both teacher and student selected goals are important, as is learning attained without goals.
Comparing behaviours to some objectively held criteria or comparing to the progress of other students determines how well something is learned.	Educative learning cannot be rated on a scale. Most learning cannot be compared either to some "objectively" conceived criteria or to the progress of other students.
The teacher-student relationship is hierarchical and the teachers assess students by how well they have met specific objectives.	The teacher-student relationship is egalitarian. Learning requires a process of trusting grades to exploration among expert and novice learners and thrives on constructive criticism.
The quality of rigour of a course can be determined by how well it helps its students meet the discipline requirements as reflected by test scores, attainment of behavioural objectives, and accreditation requirements, since these reflect the agreed-upon discipline content.	The quality of rigour of a course can be determined by how well it helps students collect paradigm experiences, develop insights, see patterns, find meanings in ideas and experiences, explore creative modes of enquiry, examine assumptions, form values and ethics in keeping with the moral ideal of the caring scholar-clinician, respond to social needs, live fully and advance the profession.

Table 1: technical and professional models (Bevis & Watson, 1990)

5.2 KNOWING THE GOALS WE ARE TRYING TO ACHIEVE

There are clear parallels all the professions involved in TLE 2.0SIMPLE can draw with preparation for work in the legal profession. The creation of an educative environment for professional development needs to respond to "lived life" of the profession to provide the experiences in law that correspond to Bevis"s notions of collecting paradigmatic experiences, developing insights, seeing patterns, finding meanings in ideas and

47

experiences, exploring modes of enquiry, examining assumptions, forming values and ethics in keeping with the moral ideals of the profession. Further, there is in the case of law the need to work as a team with fellow lawyers and other professionals and to work in a way that makes economic and business sense. This also applies, of course, to other professions.

5.3 Understanding the need for narrative that provides the opportunity to fulfil the goals

The paradigmatic experiences are keys to the TLE 2.0SIMPLE enterprise. The first role of the project teams in each of the centres is invention and analysis of stories in which the learners can participate and engage with to be able to acquire and rehearse the skills that an entrant to the profession can expect to exercise - narratives typical of the professional life in the legal profession. Assessment then is part and parcel of the ability to act as a professional.

48

5.4 Mapping these issues onto the capabilities and potential capabilities of the TLE 2 toolset

When we have these narratives it is then part of the TLE 2.0SIMPLE process to break them down into scripts. A script is analysed in terms of the actors who will be involved and the transactions over time that will happen between the actors. Further elements of TLE 2.0SIMPLE are the knowledge and resources that will be deposited with each actor, the other knowledge resources that are required, and the recourse to discussion, feedback and help. Wherever practical TLE 2.0SIMPLE will attempt to keep this within the narrative - thus help may reasonably come from a senior partner rather than a tutor or moderator.

49

An important part of the output of TLE 2.0SIMPLE will be the development of design support for creating narratives and turning those narratives into simulation scripts. TLE 2.0SIMPLE is starting from the experience of the Learning Technologies Development Unit and their work on Ardcalloch; additional important work on this has been carried out in the Netherlands, on the Sieberdam Project, amongst Dutch e-learning groups and consultants, as well as in the current design work of location-based games at Futurelab and developments in IMS Learning Design (Griffiths and Blat 2005; Owen, Grant, Sayers & Facer 2006).[7]

50

6. Project Evaluation

The project will adopt a systemic and holist approach to its research and evaluation. We realise it is insufficient to assess and evaluate the TLE2.0 software itself - we will need to look at the methods by which a system copes and changes in order to embed innovation in higher education. We shall do so by applying Engeström"s cultural historic activity theory (Engeström 2005). As well as evaluating the tool itself this approach will also analyse the ways the institution and the division of work within the institution has to change in order to make the innovation successful. This process began in our small-group meetings at Ross Priory. For instance, it was demonstrated to the group in detail how the PI project managed to feed students information in real-time through the use of postgraduate students and trainees. The logistics and costs of that were the subject of discussion (training, payment, etc) *vis-à-vis* the use of full-time academics; and this led into discussions generally about distinctions between information "feeders", online mentors, and online tutors. The online environment actually blurs the roles, and the emphasis on now one, now the other clearly arises from the design of the narrative. Such discussions showed quite clearly the significant shift in traditional roles that could occur within a simulation environment.

51

The framework that activity theory provides will be used to provide feedback to the TLE2 project community to create formative revisions of the TLE2 tool. It will also to support the implementing institutions with an understanding of how such a tool can be used more widely within a programme of study.

52

In all of this there are some questions we shall address that are part of the wider agenda of JISC:

53

What factors contribute to the effectiveness of serious games and simulations in professional development

What are effective metrics and language for assessing professionalism?

What interventions need to be made to organise game and simulation based learning in HE institutions?

What pointers to the further development of tools for gaming and simulation in professional and vocational higher education emerge from the project?

These are questions that will help the developers create an effective tool for learners and the future developers of transactional learning environments. As will be clear from this summary of the evaluative strategies we shall adopt and the issues already surfacing at the first workshop, we intend to go beyond the "application & transfer" approaches of cognitive studies outlined earlier in this article, while taking account of the results of those studies. Our evaluations, though, will be more environmental, taking account of the

54

factors that shape the ecology of culture change within an institution.

7. FUTURE IMPLICATIONS FOR SIMULATIONS IN HE

7.1 DEMAND FOR LEARNING THROUGH PRACTICE

There can be no doubt that professional learning in all disciplines is changing fast, not only in answer to market pressures and regulatory concerns, but also in response to new technologies and the pedagogies that are being constructed around them (Wenger 1998;Maharg 2006b; Barnett 2000; Eraut 1994; Schaffer 2004). While practice-based approaches to learning such as problem-based learning are being used beyond clinical disciplines, such approaches are also changing their shape as new technologies alter how they are used within curricula.[8] In many respects simulation-based approaches to learning take PBL one step further towards the practice-situation. In another, they open up possibilities for radical re-evaluation of Schön"s reflection-*in*-action criterion, and the salon-based critique approach of disciplines such as architecture, and the use of these approaches in disciplines in which they are not normally applied.

55

7.2 LARGE LEARNING OBJECTS AND PRESENT VLEs

TLE 2.0SIMPLE presents a challenge to some current orthodoxies in the use of ICT in higher education. Many institutions are implementing Virtual Learning Environment platforms (WebCT, Blackboard, Moodle, to name some) which are mandatory methods for delivering e-learning in some institutions. These environments have been designed with particular assumptions regarding pedagogy and its delivery (although some would claim neutrality). Learning objects - which in the vocabulary of the genre are the chunks of learning - tend to be small, primarily textual, and transmissive in their nature. The systems do not cater for large, immersive, highly interactive environments such as games or simulations. They do provide communication streams between learners and tutors, it is true - but often within constrained patterns determined by the management system rather than the specific needs of a learning event. Users usually require to exit the system to perform other tasks which may be meaningful in the learning context but which do not sit happily in a VLE (for example, and at a simple level, using email or a modelling tool like Excel).

56

What TLE 2.0SIMPLE demands of a learning environment is that it is transparent and does not superimpose its own personality on the learning situation. The requirements of the learning situation should derive from the learning context.

57

But the learning environment should also be able to capture and manage information that comes from much more complex learning toolsets than VLEs have historically provided. Current systems poorly support learning about professional practice, if at all. Owen (2000) suggests that a professional practice learning system has additional demands:-

58

The whole of an activity needs to be considered in the implementation (even if the implementation is not all information technology based)

There are needs for conversations that need to take place at many levels - in role play, in seeking support, in reflection, in assessment in feedback and so on.

There are needs to sustain creative and generative activities as well as responsive ones

There are needs to work around and share boundary objects (see Brown & Duguid, 2000), and to base the system around human activities and action

The need to recall and record - with the notion of a shared course or learning memory.

These needs push the types of VLEs currently implemented by HE beyond their limits.

7.3 ASSESSMENT THROUGH SIMULATION

A key function of the TLE 2.0SIMPLE experiment is of course the use of innovative assessment. As Biggs and others have taught us, assessment needs to be aligned with teaching approaches and learning environment (Biggs 1999). We have described that the GGSL experience bears this out; but in large-scale implementation of simulations across a number of quite different law schools, and different disciplines within one institution, there will inevitably be local problems that require to be defined, analysed and solved. TLE 2.0SIMPLE will clarify these problems in the specification phases of the project, and will attempt solutions not just in the code of the project tool set but in the educational documentation that the project will produce to support the tool set. These activities and products are essential tools for culture change, and will of course be available to all Higher and Further Education institutions, according to the conditions of the grants made available by JISC and UKCLE.

59

It is not too much to claim that TLE 2.0SIMPLE is a potentially significant project for one possible direction of

60

teaching, learning and assessment in FE and HE. For a highly textual discipline such as Law, the internet can be seen as a docuverse: a universe of documents, text files, cases, statutes, opinions, briefs and the like. But the docuverse has moved beyond Project Gutenberg and Ted Nelson"s Xanadu [http://en.wikipedia.org/wiki/Project_Xanadu]: increasingly it is also a metaverse [http://en.wikipedia.org/wiki/Metaverse]. The concept of a virtual reality internet was first described, appropriately enough, in Neal Stephenson"s prescient 1992 novel, *Snow Crash*. Almost a decade on from the first instantiations of that dazzling vision of a virtual reality internet in *Active Worlds*, we have multiple examples in other massively multi-user online role-playing games such as *There* and *Second Life.* These environments are already being used for online educational simulations - see examples at http://del.icio.us/secondlife/education, and http://www.simteach.com/wiki/index.php?title=Main_Page. Harvard Law School has an educational area called Democracy island. Clearly the examples cited in the deli.icio.us site are proof of concept stages in development; but nonetheless valid as educational experiments for that.

8. CONCLUSION

Can such experiments be brought within the quadrangle of the traditional curriculum? Simulations have hitherto been viewed as a form of coursework, a method of engaging students within a larger academic structure, the lineaments of which have remained broadly unchallenged. But what if simulation became less a variety of coursework and moved into the foreground of the curriculum as one of the central engines of the curriculum? What if the academic structure were inverted so that experiential learning through simulation became the *intellectual* core of the curriculum, the focus for student and staff activity, and other activities became resources for this way of teaching, learning, assessing? What effect would that have upon student learning, staff workload, and the variation and quality of learning, teaching and assessment? TLE 2.0SIMPLE sets out, above all, to begin to answer these crucial questions. 61

Others have been there, of course. It was John Dewey who perceived the value of situating and integrating world and experience at all levels of education; and he demonstrated this not just in his practical work with experimental schools, but in his educational writings where he pointed out the profound developments that education could have upon the fundamental concepts of our age: democracy, freedom, responsibility, society. With astonishing *hindsight* he saw the essential developments for education in the twentieth century and beyond. Towards the end of his life he expressed it in a poignant metaphor that brought together space and time: 62

To gain an integrated individuality, each of us needs to cultivate his own garden. But there is no fence about this garden: it is no sharply marked off enclosure. Our garden is the world, in the angle at which it touches our own manner of being. By accepting the [...] world in which we live, and by thus fulfilling the precondition for interaction with it, we, who are also parts of the moving present, create ourselves as we create an unknown future. 63

9. REFERENCES

Aikenhead, M., Widdison, R., Allen, T. (1999). Exploring law through computer simulation. *International Journal of Law and Information Technology*. 7, 3, 191-217

Aldrich, C. (2003) *Simulators and the Future of Learning: An Innovative (and Perhaps Revolutionary) Approach to E-Learning*, Josey-Bass Wiley, San Francisco

Bangert-Drowns, R., Kulik, J., Kulik, C. (1985). Effectiveness of computer-based education in secondary schools, *Journal of Computer-based Instruction*, 12, 3, 59-68

Barnett, R. (2000) *Realising the University in an Age of Supercomplexity*, SRHE & OUP, Buckingham

Barton, K., McKellar, P., Maharg, P. (2000) Situated learning and the management of learning: a case study, *The Law Teacher,* 34, 2, 141-163

Barton, K., Maharg, P. (2006, forthcoming) E-simulations in the wild: interdisciplinary research, design and implementation, in *Games and Simulations in Online Learning: Research and Development Frameworks*, edited by Aldrich, C., Gibson, D., Prensky, M., Idea Group Inc., Hershey, PENN.

Barton, K., & Weswood, F. (2006) From student to trainee practitioner - a study of team working as a learning experience, *Web Journal of Current Legal Issues*, 3, Special Issue on Legal Education, http://webjcli.ncl.ac.uk/2006/issue3/barton-westwood3.html

Bereiter, C. (2002). *Education and Mind in the Knowledge Age*. Lawrence Erlbaum, Hillsdale, NJ

http://go.warwick.ac.uk/elj/jilt/2007_1/maharg_owen/

Bevis, E.O., Watson, J. (1990) *Towards a Caring Curriculum: A New Pedagogy for Nursing*, National League for Nursing, New York

Biggs, J. (1999) *Teaching for Quality Learning at University*, Buckingham, SRHE and Open University Press

Brown, J.S., Duguid, P. (2000) *The Social Life of Information, Harvard Business School Press, Boston, MASS*

Dewey, J. (1988) Individualism old and new, in *John Dewey: The Later Works, 1925-53*, edited by Boydston, J.A., Southern Illinois University Press, Carbondale & Edwardsville, vol 5, 122-23

Ehman, L.H. and A.D. Glenn (1987). *Computer-based Education in the Social Studies*. Bloomington, Indiana. In: Social Studies Development Center and ERIC Clearinghouse for Social Studies/Social Science Education, ED 284 825

Engeström, Y. (2005). *Developmental Work Research: Expanding Activity Theory in Practice*, Berlin, Lehmanns Media.

Engeström, Y. (1987) *Learning by Expanding: an Activity-Theoretical Approach to Developmental Research*. Orienta-Konsultit, Helsinki.

Eraut, M. (1994) *Developing Professional Knowledge and Competence*, London, Falmer Press

Francis, R. (2006) **Playing to learn: a case study of MITs Revolution Simulation**,

Gee, J.P. (2003) *What Video Games Have to Teach Us About Learning and Literacy*, New York, Palgrave Macmillan

Garfinkel, H. (2001) *Ethnomethodology"s Program: Working Out Durkheim"s Aphorism*, Rowman & Littlefield Publishers, New York

Greeno, J.G., Collins, A.M. & Resnick, L.B. (1996) Cognition and learning. In *Handbook of Educational Psychology* edited by D. Berliner & R. Calfee, 15-46. Macmillan, New York.

Greeno, J.G. & Moore, L.M.J. (1993) Situativity and symbols. (Response to Vera and Simon). *Cognitive Science*, 17, 49-5 9.

Griffiths, D., Blat, J., (2005): The role of teachers in editing and authoring units of learning using IMS Learning Design, *International Journal on Advanced Technology for Learning (ATL)*, Special issue on Designing Learning Activities: From Content-based to Context-based Learning Services, 2, 3

Hutchins, E. (1995) *Cognition in the Wild*, Cambridge, MASS, MIT Press

Kress, G., van Leeuwen, T. (2001) *Multimodal Discourse: The Modes and Media of Contemporary Communication*, London, Hodder Arnold

de Jong, T., van Joolingen, W.R. (1998). Scientific discovery learning with computer simulations of conceptual domains. Review of Educational Research. 68, (2), 179-201

Lave, J. & Wenger, E. (1990). *Situated Learning: Legitimate Peripheral Participation*.

Cambridge University Press, Cambridge.

Laurillard, D. (2005) E-learning in higher education, in *Changing Higher Education: The Development of Learning and Teaching*, edited by Paul Ashwin, RoutledgeFalmer

Leontiev, A.N. (1981) *Problems of the development of the mind.* (anonymous translation).Progress, Moscow. (Original work published in Russian, 1959).

Maharg, P. (2001) Negotiating the web: legal skills learning in a virtual community, *International Review of Law Computers & Technology*, 15, 3, special edition, *Web-based Teaching, Learning & Assessment in Law*, edited Maharg, P., 345-361

Maharg, P., Paliwala, A. (2002) Negotiating the learning process with electronic resources, in *Effective Learning and Teaching in Law*, edited Burridge, R. *et al.*, Kogan Page, 81-104

Maharg, P. (2006a, forthcoming) Authenticity in learning: transactional learning in virtual communities, *Innovating E-Learning 2006: Transforming Learning Experiences*, http://www.jisc.ac.uk/elp_conference06.html

Maharg, P. (2006b) On the edge: ICT and the transformation of professional legal learning, *Web Journal of Current Legal Issues*, 3, Special Issue on Legal Education, http://webjcli.ncl.ac.uk/2006/issue3/maharg3.html

Mandl, H., Gruber, H. & Renkl, A. (1994). Knowledge application in complex systems. In Vosniadou, S., Corte, E. D. & Mandl, H. (Eds.) *Technology-Based Learning Environments*, NATO ASI Series, Berlin-Heidelberg: Springer-Verlag, 40-47.

Marton, F. & S. Booth (1997). *Learning and Awareness*. New Jersey, Lawrence Erlbaum. Associates.

Oswalt, I. (1993) Current applications, trends, and organisations in US military simulation and gaming, *Simulation and Gaming*, 24, 2, 153-89

Owen , M. (2000) *Paradigms for curriculum design: The Design of Reflective, Situated, Collaborative Professional Development Supported by Virtual Learning Environments*, EURODL, 2000, http://www.eurodl.org/materials/contrib/2000/owen/owen.html

Owen, M., Grant, L., Sayers, S., Facer, K. (2006) *Social Software and Learning*, Futurelab, Opening Education Series, www.futurelab.org.uk/research

Pidd, M. (2002) *Computer Simulation in Management Science*, John Wiley & Sons, Chichester

Rieber, L.P., Parmley, M.W. (1995). To teach or not to teach? Comparing the use of computer-based simulations in deductive versus inductive approaches to learning with adults in science, *Journal of Educational Computing Research,* 14, 4, 359-74

Rystedt, H., Lindwall, O. (2004). The interactive construction of learning foci in simulation-based learning environments: a case study of an anaesthesia course. PsychNology Journal. 2, (2), 168-88

Salen, K., Zimmerman, E. (2006) *Rules of Play. Game Design Fundamentals*, The MIT Press, Cambridge MASS

Salen, K., Zimmerman, E. (2004) *The Game Design Reader. A Rules of Play Anthology*, The MIT Press, Cambridge MASS

Satava, R.M. (2001) Surgical education and surgical simulation, *World Journal of Surgery*, 25, 11, 1484-89

Shaffer, D. W. (2004). Pedagogical praxis: the professions as models for post-industrial education, *Teachers College Record,* 106, 7, 1401-1421

Shute, V.J., Glaser, R. (1990). A large-scale evaluation of an intelligent discovery world: Smithtown. Interactive Learning Environments. 1(1), 51-77

Squire, K. (2005) Game-based learning: An emerging paradigm for instruction, Academic ADL Co-Lab Initiative, http://www.academiccolab.org/initiatives/papers.html

Squire, K., Shaffer, D.W. (2006) The pasteurization of education, In *Education and Technology: Issues in Policy, Administration and Application.*London, Elsevier.

Squire, K. (2003). Video games in education. *International Journal of Intelligent*

*Simulations and Gaming,*2, 1.

Suchmann, L. (1987) *Plans and Situated Actions. The Problem of Human-Machine Communication*, Cambridge, Cambridge University Press

Thomas, R. & Hooper, E. (1991). Simulation: An opportunity we are missing. *Journal of Research on Computing in Education, 23*(4), 497-513.

Vygotsky, L. S. (1978). Mind in society. Cambridge, MA: Harvard University Press.

Wenger, E. (1998) *Communities of Practice: Learning, Meaning and Identity*, Cambridge, Cambridge University Press

Weller, J. (2004) Simulation in undergraduate medical education: bridging the gap between theory and practice, *Medical Education,* 38, 1, 32-38

Windschitl, M., Andre, T. (1998). Using computer simulations to enhance conceptual change: the roles of constructivist instruction and student epistemological beliefs. Journal of Research in Science Teaching. 35, (2), 145-60

10. APPENDIX 1: PROJECT PHASES, OUTPUTS AND OUTCOMES

10.1 PROJECT PHASES

Phase 1

Project management, formation of detailed project plan, milestones, specific deadlines for all project deliverables; specific roles and responsibilities of the partners and team personnel. Creation of project web site and communications plan for entire project and beyond. Continuous project management.

Phase 2

Specification of an open source platform for the delivery of TLE projects. Liaison with case study staff on task design and implementation issues.

Phase 3

Development of open source, open standards platform to enable the creation, delivery and management of TLE projects

Phase 4

Use-case approach of task design and use, based upon case study sites within Strathclyde University. Use case study of SLI mobile collaborative learning within the university, where four virtual professional groupings, at least 16 students in total, would work with SLI laptops each within the TLE. Use case approach with implementation in three law schools in England and Wales.

Phase 5

Evaluation of student learning, of staff roles and experiences, of administration roles and integration, and organisational issues arising from large-scale implementation. Dissemination of evaluation results at conferences, road-shows, seminars and in papers to be published in peer-reviewed journals and as book chapters. Dissemination of TLE 2.0SIMPLE as a fully-functioning environment, free, to interested parties in HE and FE.

Phase 6

Post-project. Dissemination of project applications; further development of TLE within LTDU; archiving of all project documentation on the website for a minimum of three years *post*-January 2008.

10.2 PROJECT OUTPUTS

1. TLE 2.0SIMPLE: a suite of tools within a simulation environment

2. Technical volumes, including manuals and designs

3. Educational guidelines and advice as to best practice in the design and use of simulations and serious games, and assessment of students using these tools

4. Completed case studies of the use of the TLE across all collaborative departments and schools

5. Community of practice within the participant departments as a nucleus for further development, clustered around a CoP website

6. Knowledge and experience shared in workshops, roadshows (particularly with HE Centres such as UKCLE and other HE Centres associated with the project, eg Architecture)

7. Conference papers; published articles; currently also investigating the possibility of an edited book arising from the project

http://go.warwick.ac.uk/elj/jilt/2007_1/maharg_owen/

8.　　　　Project web site

9.　　　　Project completion report

10.3 PROJECT OUTCOMES

1.　　　　Enhancement of student learning across professional curricula in FE and HE

2.　　　　Simulation environment that can be used by both students in FE and HE, and by professional training organisations, thus bridging forms of learning between academic programmes and continual professional development

3.　　　　Tool suite that will enable staff to engage with students in simulations that site learning firmly within professional contexts

4.　　　　Contribution to research on the use of e-simulations and professional learning, and mobile learning; and large-scale implementation within an institution

5.　　　　Awareness-raising amongst staff of the usefulness of simulation learning techniques for undergraduate and postgraduate curriculum design and teaching

6.　　　　Collection of case studies across the professions

11. ENDNOTES

1 For Wikipedia definitions of these acronyms, see MUD [http://en.wikipedia.org/wiki/MUD], MOO [http://en.wikipedia.org/wiki/MOO] and MMORPGs [http://en.wikipedia.org/wiki/Mmorpg]

2 *Encyclopaedia of Educational Technology,* http://coe.sdsu.edu/eet/articles/usflearning/index.htm

3 As a result of our two-day masterclass to representatives of 14 universities in the Netherlands in 2002, the Dutch government-funded RechtenOnline Foundation directed the 18-month development of a TLE for Dutch law schools, called Sieberdam. We have used this environment on an interdisciplinary international business project (set between Dutch Business students in Erasmus University, Rotterdam, and law students on the Diploma in Legal Practice at the GGSL.

4 The bid was in response to JISC"s "Large-Scale Implementation of Innovative Technologies" call, in their E-Learning and Innovations strand. For the JISC TLE 2.0SIMPLE project web site, see http://www.jisc.ac.uk/index.cfm?name=eli_tle&src=alpha. For the GGSL website including latest information regarding the status of the project, see http://technologies.law.strath.ac.uk/tle2. UKCLE is a joint funder as well as a project partner, generously matching JISC"s funding of £100,000. UKCLE will be assisting with co-ordination of the English and Welsh law schools involved in the project, and will taking a leading role in dissemination of the project results and the application within the Law, as well as liaising with other HE subject centres. Futurelab will be largely involved in the evaluation of the project, and will contribute their substantial knowledge in the development and implementation of games and simulations. For more information, see the Futurelab site at http://www.futurelab.org/.

5 We are grateful to BILETA for providing us with the funding to enable this workshop to take place.

6 The template was created by our sister simulation environment, the Sieberdam project, and was adapted for our use with their permission.

7 See for example the site of Pieter van den Hijden at http://www.sofos.nl/index.html; and the site of the KODOS group at http://drcps.tudelft.nl/#/projects/14

8 See for example IVIMEDS [http://www.ivimeds.org/] and MedBiquitous [http://www.medbiq.org/]