

Using A Virtual World For Transferable Skills in Gaming Education

M. Hobbs, E. Brown, M. Gordon

Department of Computing, Anglia Ruskin University, 1 East Road, Cambridge, CB1 1PT,

m.h.w.hobbs@anglia.ac.uk, e.brown@anglia.ac.uk, m.gordon@anglia.ac.uk

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Abstract

This paper suggests that some of the needs for transferable skills in general, and in particular for the gaming industry, can be met by the appropriate use of gaming and virtual world environments. We hope to show that virtual worlds provide a logical progression in the use of computer mediated learning tools within a constructivist pedagogical perspective. We briefly discuss the educational properties of virtual worlds and in particular that of Second Life. We propose a project for developing group work which seeks to link affordances in the environment to learning outcomes and employs a socially-situated, constructivist pedagogical framework derived from educational learning theory.

1 Background

1.1 Transferable skills and Education

The technical skills required to develop the current generation of realistic 3D games represent some of the more complex and involved elements of software engineering and applied computer science ([Stone, 2004](#)). Demand for, and supply of, degrees targeted towards gaming, animation and 3D visualisation is on the increase. However, it is probable that not all those wishing to enter this profession will find employment in places where such specialist knowledge is required. Education that is aimed at this industry must therefore have a broad base and convince students, parents, employers and even academics that it provides a well rounded learning experience. Employers demand that technical ability is accompanied by a range of graduate qualities that are transferable to the workplace ([Fallows and Steven, 2000](#)). The kinds of skills that are valued by employers (from a survey of 13 large organisations ([TRANSEND, 1999](#))) are reasoning, analysis, interpersonal skills, teamwork, organisation and ICT skills. This paper seeks to show that these sorts of skills are increasingly the goal of mainstream higher education and that gaming environments provide extra opportunities to develop and practice these skills.

Current practice in Higher Education is moving away from didactic content delivery, the transfer of discrete, abstract, decontextualised concepts towards constructionist, student-centred models with increasing emphasis on the skills that support independent, self-motivated learning. This trend, reported on at length by the influential Tavistock report ([Cullen et al, 2002](#)) is increasingly facilitated by use of virtual learning environments (VLEs) such as WebCT or Moodle. Initially used as little more than document delivery and distance learning tools, VLEs are increasingly being used to support collaborative learning by providing areas where students can comment, contribute and share their learning ([Mason, 1998](#)). Discussion forums, online chatrooms and journal facilities are no longer peripheral to online lecture notes but are core to the learning process ([Salmon, 2004](#)). Moodle in particular has a strong philosophical and pedagogical foundation in social constructionist philosophy ([Rice, 2006](#)). The constructionist view is that people actively construct new knowledge as they interact with their environment ([Jonassen, 1992](#)). The project outlined in section 3 in this paper has been constructed to help provide information on how a rich interactive learning environment can assist the essential mapping between the learning experience and the internal representation of the world which is core to the constructivist approach. The practice and refinement of these learning skills, where the learner takes more responsibility for what and how they learn, should help to develop transferable skills in the areas of autonomous learning, collaboration and self motivated problem solving.

1.3 Games and Virtual Worlds

1.3.1 Online Games

The gaming software industry provides systems and environments that offer a much greater range of interactive possibilities than the current generation of virtual learning environments. Massively Multiplayer Online games (MMOs) routinely attract millions of players ([Ducheneaut et al., 2006](#)), who interact in range of sophisticated ways representing potentially useful transferable skills. The typical MMO provides a context for role playing where goals are attained by gaining expertise in the built in features of the game and by communication, trade and interaction with other players. For some tasks (e. g. storming a castle) large scale cooperation and group coordination are required.

The Horizon report on trends in higher education ([New Media Consultants, 2006](#)) emphasises knowledge as community property and identifies the increased use of gaming environments for teaching and learning. However, typical gaming environments such as World of Warcraft have a restricted pre-defined

structure that are not easily adapted to purely educational purposes. ([Livingstone and Kemp, 2006](#)). The focus on action, fighting and warfare do not sit well with reflective educational activities. However, some have been used in their role playing context and the experiences gained in playing those roles have been used to develop discussion and reflective skills in students ([Francis, 2006](#)), collective investigation and an introduction to the principles of social science research ([Delwiche, 2003](#)), or even database design concepts ([Connolly et al, 2006](#)). Some of these environments have been modified for use in teaching particular subjects, for example, foreign language ([Tactical Iraqi, 2006](#)) and counter terrorism, ([Interactive Media Laboratory, 2006](#)).

1.3.2 Virtual Worlds

Virtual worlds have been investigated for educational use since the mid 1990s, as shown by the ExploreNet Experiment ([Hughes and Moshell, 1997](#)). However, at that time the number of potential users was restricted by the hardware and connection requirements. Now there is a much wider potential user base, both in terms of the availability of the supporting technology and the experience / expectation of users ([Book 2006](#)). There are more potential students and just as importantly, as outlined in section 1.1, an increasing desire to use these tools by a wider range of staff to support new teaching techniques.

The active worlds learning environment 'AWEDU' ([Active Worlds, 2006](#)) originated in the mid 1990s and allows educational worlds to be built for a variety of purposes. Most commonly used for distance learning and the exploration of three dimensional constructs they tend to mirror a classroom environment where interaction is principally between the registered participants ([Dickey 2005, Dickey 2003](#)). In addition to content added by teachers a virtual world is perceived as having some intrinsic benefits - helping to expose students to novel applications of technology, practice in mediated communication and as an example for the development of virtual and gaming environments. The social aspects of learning are also well supported well by a virtual world and help to maintain interest ([Cobit, 2002](#)). This matches our experience ([Brown 2006](#)) with activities facilitated by a more traditional e-learning discussion board that was used as an intrinsic part of a course delivery; student feedback gave significant support to the benefits of this to improve engagement and participation.

The research in this field seems to suggest that there are educational advantages in a virtual setting ([Benford et al, 2001](#)). However, as Livingstone and Kemp point out ([Livingstone and Kemp, 2006](#)), there is little point in creating virtual classrooms which require synchronous supervision. The strength of a rich virtual environment is that it can provide exploration activities more akin to field trips than the traditional classroom.

1.4 Second Life

Second Life (SL) is a 3-D virtual world built and owned by its users / residents that has run since 2003 and now caters for 200,000 residents ([Linden, 2006](#)). It provides considerable independence for manipulation of the environment allowing action scripting, object construction and an economy that supports the creation of virtual businesses. At first glance SL seems strange as it appears to lack the challenges that provide the positive feeling of accomplishment enjoyed by a typical game environment. In contrast to traditional MMOs it has no predefined goals or objectives, is completely open to how it may be used and offers a neutral framework for the creativity of its users. From time to time one may see residents tooled up with weapons ranging from the traditional Japanese swords worn by Hiro Protagonist

in Snow Crash ([Stephenson 1992](#)) to post apocalyptic, cyber-punk weaponry to rival anything from science fiction film or literature. But, the focus of the environment is far from combat. Although there are some areas set aside for combat the core philosophy is to live and let live with most areas forbidding disruptive or abusive behaviour. The whole experience is based around personal, self-motivated, exploration and discovery of both the environment and your co-residents. The lack of pre-defined goals allows a greater range of action and expression with a much greater emphasis on residents getting together to create their own content. A recent SL event mirrored the relay for life charity walk for the American Cancer Society and had 1,000 participants and raised \$40,000 ([ACS, 2006](#)). The activities of in-world commerce are significant enough to be covered by Business week ([Hof 2006](#)) and are measured in hundreds of thousands of US dollars, currently the in-world currency the Linden dollar is appreciating against the US currency.



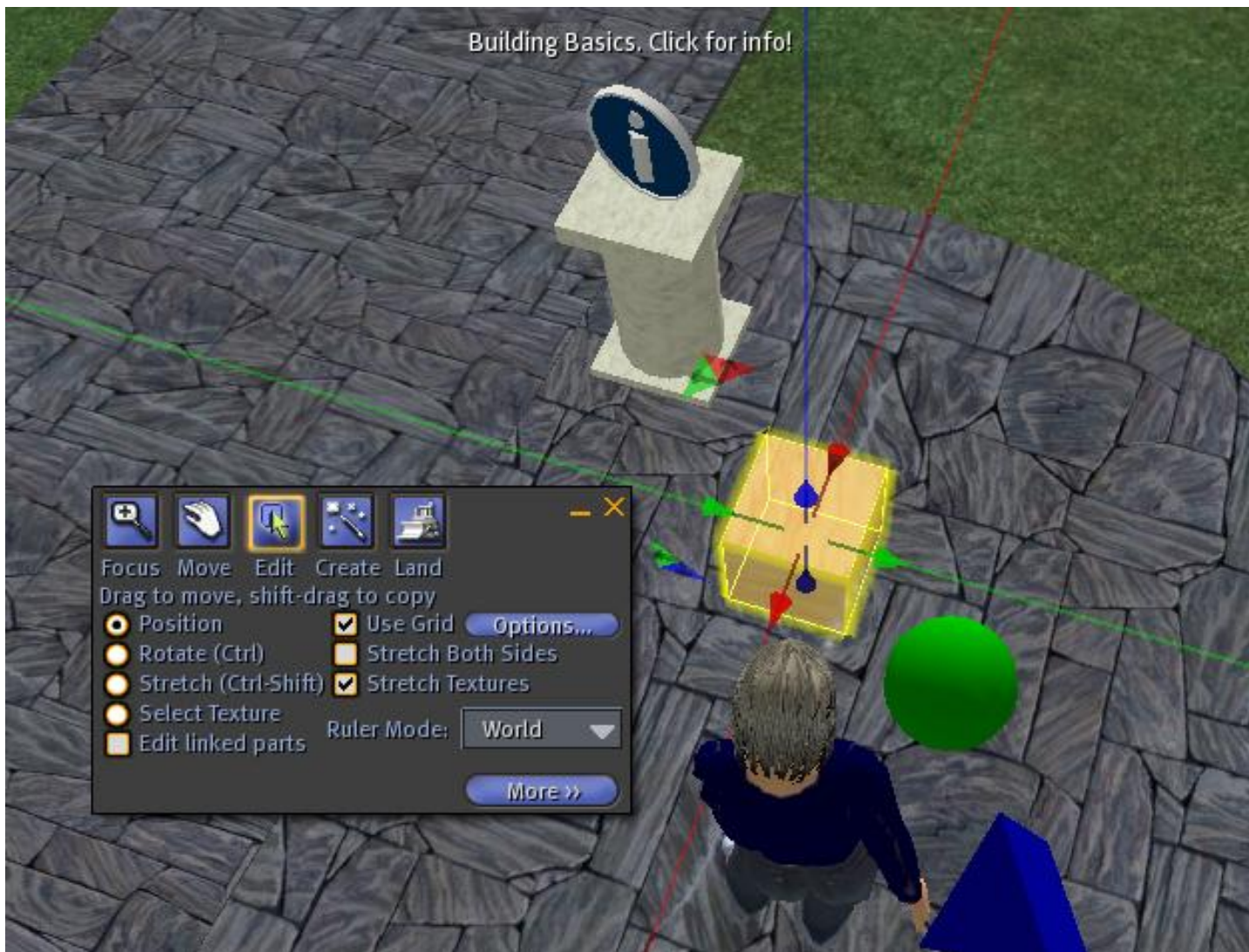
Second Life round table community meeting - showing various avatars dancing and socialising.

SL provides educational resources ([SL education](#)) and Sim teach ([SimTeach](#)) provides links, a wiki and a bibliographic resource for educators using Multi-user virtual environments. The company that runs Second Life, Linden Research, are supporting this activity with a campus registration ([Linden, 2004](#)) that provides an environment for teaching classes in areas of urban planning, game design, social and business studies ([Terdiman, 2004](#)). Livingstone and Kemp ([2006](#)) provides a good overview of the features that make SL a popular choice for educators.



Second Life Concert in the International Space Flight Museum

Interaction is fundamental to knowledge acquisition and with a virtual world we can provide more than a linear 'point and click' progress through pre-prepared learning materials. However, it has been found that interacting with multimedia does not in itself contribute to the learning process ([Granger & McGarry, 2002](#)). Learning activities need to be designed to take account of the motivating factors that are best supported by the environment and to map these to the requirements of the topic ([Laurillard, 2000](#)). The environment and the learning activities together provide the realistic environment where academic skills can be grounded in meaningful practice.



Second Life object construction and editing - image taken at the Learning Centre showing newly created object, the editing tool and in-world help on building objects.

2 Potential Benefits

2.1 Communication, community and sharing

In-world communication in SL is through instant messaging either directly to a resident (wherever they are), to a local group within 'shouting' distance, or chatting, or whispering to residents within a smaller radius (typically one to one). Using instant messaging, one has to communicate effectively within the limits of the technology, which offers dual aspects of a recorded (similar to writing or email) but discursive (similar to a face to face conversation) medium. Communication about activities within SL need not be limited to the tools provided by the environment itself. Voice over IP systems such as Skype have been used to help coordinate small groups of residents and to free up keyboard action for avatar control. Judging when to use which communication system is a useful skill that would be transferable into the workplace. It may be that the ability to collaborate, discuss and chat about events and artifacts within the virtual world has some parallels to team building exercises in the commercial world. Increased peer group interaction and cooperation was also noted by Dickey ([Dickey, 2003](#)) in an evaluation of a synchronous distance learning in the Active Worlds environment.

Adequate communication is only one aspect of effective team work, other important aspects are how

members interact with each other - in education terms this is a community of practice. Communities of practice are groups of people who share a concern or a passion for something they do, and learn how to do it better as they interact regularly. The benefits include engagement with activities, feelings of connectedness, increased satisfaction belonging and trust, support, increased confidence, personal development and even a sense of fun ([Wenger, 2006](#)). Such groups are defined by what members do together, and are seen to develop around 'things that matter', such as learning and the kinds of open ended problems that benefit from informal collaborative activity. It is stating the obvious that when people enjoy the social aspects of a task they tend to work better, but perhaps it is a little less obvious that these informal socialisation skills can and should be encouraged in an academic setting. It is hoped that practice in developing communities of practice within the partially structured virtual world environment will transfer to skills that enable better collaborative and group work within the workplace.

2.2 Ownership and Engagement

In our own teaching practice we have found that student feedback on the use of VLEs supports the theory that a sense of ownership and engagement can be facilitated by a customisable interface. The ability to customise Moodle was a key factor in students preferring this VLE, despite some technical problems, to the completely non-modifiable WebCT. The ability to create your own avatar, build and decorate your own home and make your own friends provides a high level of personal control which can provide a feeling of ownership which can be directed towards increased engagement with the subject matter. The intrinsic in-world point of view of an avatar enhances telepresence (a user's experience of seeming to be present in a remote environment by means of a communication medium ([Qiu and Benbasat, 2005](#))) and helps to give an experience that is both individual and socially credible.

We know from our own experience ([Brown, 2006](#)), and others ([Rovai, 2002](#)), that students are likely to be more satisfied with their course if they feel involved, and further if they develop relationships with other members of the learning community. It is expected that the considerable scope for personalisation and independent activity will contribute to a sense of community. This is an important factor that we wish to assess in terms of making the learning experience more personal, memorable and real. The aim is to encourage learning behaviour that is not restricted to a closed academic environment but will transfer to the work place and into lifelong skills.

3 Anglia Ruskin Virtual Worlds for Group Work Research Project

3.1 Aims

Anglia Ruskin University is funding this research project from the University Center for Learning and Teaching (UCLT) with the specific brief to extend understanding and inform teaching practice. Previous studies into virtual worlds ([Dicky, 2003](#); [Dickey, 2005](#)) have provided important insights into the pedagogical implications of these systems. This project will build on, and contribute to, the on going evaluation of such systems and start the process of establishing techniques for their effective use in a computer science curriculum.

In order to focus on the unique pedagogical features we will not be looking at it in the context of a distance learning tool, even though it is ideally suited for that role. We want to see what this kind of system can provide in conjunction with other options including face to face class room and seminar

sessions as well as other more traditional computer supported learning environments such as WebCT and Moodle. The ability to use the best tool for the job will highlight where the virtual world provides real advantages.

3.2 Methodology

The research will be carried out as an evaluative case study using material recorded from the interactions of students carrying out a set of tasks. The core analysis methodology will be based on affordance theory ([Gibson, 1977](#); [Norman, 1999](#)) which seeks to relate features (affordances) of a system, as perceived by the user, to actions and behaviour that it supports. We will measure the system in terms of affordances and constraints as they impact on the learning outcomes of the tasks. At a finer level of detail common behaviours used to attain sub-goals will be identified, classified and mapped to affordances. Laurillard ([Laurillard 2000](#)) demonstrates how this may be done for educational CDs which, although more constrained, share the non-linear nature of a virtual environment.

The underlying constructivist pedagogical perspective implies that task completion is not an adequate measure on its own. We will also measure how the students develop in the sophistication of their interactions. To guide this more subjective evaluation we will map Gilly Salmon's ([Salmon, 2004](#)) five stage model, developed for e-learning environments, to types of communication activity seen in the virtual world. The core steps are as follows:

- access and motivation
- online socialisation
- information exchange
- knowledge construction
- development

We will be looking for evidence of communities of practice, although in this short term evaluation it may be that these will not be fully developed. We will look for signs that the environment helps to support such social constructs by looking for positive or negative influences on Wenger's principles for communities of practice ([Wenger et al, 2002](#)).

3.3 Experimental design

Students will be guided through a series of tasks that start as orientation exercises and become increasingly complex and open ended. In keeping with the desire to develop autonomous, self motivated learners these activities will be designed for self-completion rather than as part of an organised class. An in-world mentor will be available for guidance and to help motivate the participants. Additionally, students will be able to call on the considerable in-world resources provided to help new residents in SL. An ancillary role for the mentor will be to observe the interaction of the participants and their use of the facilities provided by the environment. However, as there are no restrictions on when students may enter and use the system, the mentor will not be expected to be on hand at all times. Supporting the in-world activities will be face to face tutorial sessions to provide a broad explanation of aims of the project. Additionally, the Moodle VLE will be used to supply documents, explanations, instructions links and online activities and more importantly provide journal facilities for recording and reflection. Feedback from students will be recorded in a number of ways -

- Snapshot photographs uploaded to 'snapzilla' (the SL linked online photo repository),
- Moodle forums for discussions about in-world experiences
- Moodle journals for more detailed accounts and reflection
- In world recording devices worn and controlled by students to capture IM conversations.
- Logbooks and records made as part of the tasks.
- Use of the SL video recording system Machinima to provide diaries of activities.

3.4 Research issues

The detailed research questions we hope to be able to answer are:

- E-leaning and anonymity - is a convincing telepresence supportive, neutral or negative when comparing the communication medium to a discussion board?
- Cost benefit - we would expect to see some students take to the environment like ducks to water but it is clear that there is a much higher threshold to using a 3D avatar than there is in typing text into a discussion group, will the increased effort needed be seen to be worth the perceived benefits by the students?
- Engagement - it is not enough to be interesting and innovative students must find that there is a correspondence between the technology and what they perceive as being useful to them. Laurillard ([Laurillard, 2000](#)) and Mason ([Mason, 1998](#)) suggest that complex social and educational situations are not solved by technology alone. In our own practice ([Brown, 2006](#)) we have identified five key points that effect engagement in the use of discussion groups, which we intend to follow up in the virtual worlds project, as follows:
 1. students do not find 'fun' a primary motivator to choose to use technology.
 2. students use technology when it is perceived as useful to them.
 3. assessment is one motivation for using technology.
 4. students with less self-confidence prefer more structured navigation.
 5. it's not the technology per se, it's the nature of the activity utilising the technology, and it's perceived value.
- Community - do interactive environments help to establish a sense of community and support communities of practice?
- Transferable skills - will the activities improve skills that can be transferred to other group work in the educational context and into the work environment?

4 Summary

The core graduate skills of communication, social interaction and group work, research and application of problem solving skills are all well supported by a virtual world environment. By embedding some of a curriculum within such an environment the learning outcomes should be no harder to reach. With careful planning the intrinsic properties of the virtual world can inform transferable skills and provide a rich case study for learning about gaming technologies and strategies. The open ended nature of the multi user environments can also lead to more realistic problem solving behaviour and allow for full life cycle development. The experiences of the late 1990s ([Hughes and Moshell, 1997](#)) demonstrate that there is a

potential for learning with virtual worlds which can now be realised with the availability of technology and communications. More skills are needed to use these environments but they can broaden skills in areas of socialisation, group work and independent problem solving.

Future work

As a follow up to the group work project we have planned a programming project that will be used to support first year, computer science undergraduates in learning to program. The emphasis here is to re-enforce basic programming skills, using SL as an interactive programmable environment. We expect to facilitate greater sharing, learning from group members and learning from the wider virtual world outside the group. We would also like to see how students transfer these meta-programming skills learned in-world to the traditional programming development tasks and environments.

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