Difficult, Dangerous, Impossible...: Crossing the boundaries into Immersive Virtual Worlds

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Abstract:

The use of Immersive Virtual Worlds (IVWs) for teaching and learning has been attracting increasing attention recently, and a number of universities already have a virtual presence in environments such as Second Life. Given the newness of the endeavour, there is little guidance on how to best make use of the affordances of virtual worlds, however, a number of educators are experimenting with these environments and beginning to share their experiences.

In this paper, we describe our own use of Second Life in a course designed to teach students about the creation of interactive learning environments. In our case, Second Life was used in conjunction with real life sessions as both a vehicle for teaching and learning, and also an environment in which our students could create learning experiences for others.

Moving into teaching and learning in Second Life requires crossing a number of boundaries in addition to the obvious boundary between the real and the virtual. In discussing this experience, we describe the boundaries encountered, and the opportunities they presented.

Finally, we analyse this experience from the perspective of the “Diffusion of Innovation” model and its extensions to educational contexts. Our analysis suggests that students and staff have different profiles in terms of their attitude to risk, and their focus on learning products or process, and that part of the learning experience involves helping students become aware of these characteristics, and allowing them to experiment with situations of greater risk.
Introduction

Immersive Virtual Worlds (IVWs) have gained a great deal of attention in the education community in recent years. The 3-dimensional nature of IVWs enables activities and interactions which are not possible in 2-dimensional virtual environments, and may provide a platform for activities which are not easily accommodated in normal classroom environments. Our particular focus has been on teaching aspects of subjects which might be considered difficult, dangerous, or even impossible to teach in real life for various reasons.

At the present time, there is no primer for how to teach in an IVW. Many educators are beginning to explore the possibilities and to share information about what they are doing, but all are on a journey of discovery. That journey involves utilising knowledge and experience gained from other classroom experiences and from the general body of learning theories, but it also means confronting the unknown, taking risks and developing new approaches which may or may not be linked to previous knowledge and experience.

Not only are IVWs unfamiliar territory for teachers, students are also being asked to engage in a new learning experience which may present unexpected challenges and involve a degree of risk taking. The diffusion model (Rogers, 1962) may be useful in examining the learning curve for both teachers and students.

In this paper, we explore some of the challenges and opportunities experienced by teachers and students on a module taught at the University of Sussex in Spring 2008 on the topic of Interactive Learning Environments (ILE 2008). The module introduced students to a number of learning theories and technologies for learning, and required them to work in teams to develop interactive learning experiences within Second Life (SL), a well known IVW. This was the first time the staff team and the students had worked in SL and this paper discusses a number of the challenges encountered by both.

The rest of the paper is structured as follows: Section 2 provides a brief overview of the module and context, Section 3 identifies various boundaries which were encountered and crossed during the course, Section 4 examines the challenges from the perspective of the diffusion of innovation model (Rogers, 1962), Section 5 explores this model further and Section 6 provides a brief conclusion.

2. ILE 2008

The Interactive Learning Environments course has been running for a number of years. It is offered as an option to 3rd year undergraduates and Masters’ students on a range of computing and IT degree courses. Although some of the students have a strong foundation in computer science, many have studied music, languages and arts within their degree profiles. Additionally, the Master’s degree is a conversion course, which means that the postgraduate students have a wide range of educational and professional backgrounds and experience.

As part of their studies, students are required to develop a learning experience, utilising the learning theories taught within the course. In recent years, Moodle has been used as a platform for this practical exercise. For ILE 2008, the decision was taken to use SL as the environment for developing interactive learning experiences.
In addition to the change in platform, there was also a decision to offer students projects which had real world relevance, and the potential to be taken up and used in an educational setting. We adopted a problem based learning approach, as described in (Good et al., *in press*). Recently, there has been an emphasis on vocational learning, or learning for work, within UK education. ILE 2008 was taught by a small team, bringing together expertise from the Sussex Learning Network (SLN) and the Open University as well as experienced teachers from the University of Sussex. In order to provide the students with realistic scenarios, partner institutions of the SLN were asked to identify areas of their teaching which were difficult, dangerous, or impossible to teach adequately in a classroom setting. This resulted in eight projects with foci as diverse as mental health assessment, child protection issues, numeracy for nurses, drug search procedures for police officers and elements of systems theory.

Students registering for the module were advised to familiarise themselves with SL over the Christmas break, and were provided with information on how to register an avatar in SL, and how to keep themselves safe in the virtual environment. Although a few students followed this suggestion, the first session of the course provided an opportunity to ensure all students had an avatar. During the second week of the course, students were introduced to basic building skills through a class taught inworld by an experienced SL resident. During this early part of the course, students formed themselves into teams and were allocated their projects. Each team had the opportunity to interview the client for their project either face-to-face or using telephone conferencing or Skype. Following the interviews, students drafted initial project specifications and received feedback on these from each member of the staff team.

As part of their assessment, students were required to create an interactive learning experience in SL for their clients, to prepare a machinima describing their work, and to prepare three written pieces of work, namely, a project specification, a group description of the process, and an individual, reflective document.

The course was supported by weekly lecture/workshop sessions, group consultations and staff presence in SL. Some of the teaching content utilised videoconferencing. There was a course website, hosted on Moodle, with background reading and other support materials.

### 3. Boundary issues

During the course planning, it became clear that we would be confronted by a number of potentially complex organisational and logistical issues. Each of these presented both challenges and opportunities. ILE 2008 was an established course in an institution with a strong academic reputation. In seeking clients who were teaching vocational courses in other institutions, including teaching further and higher education courses in further education colleges, we would be crossing a number of boundaries. It was only when we began to work with our colleagues, both within the ILE 2008 staff team and with colleagues from the SLN partner institutions, that we realised the extent to which we were not only crossing institutional boundaries, but that we had very different approaches to learning, to curriculum development and to assessment.
As well as institutional, curricular and professional boundary issues, we encountered a number of challenges and opportunities which related to working within the Second Life environment. We were very much engaged in a learning experience alongside our students.

This section considers the various boundary issues we encountered, which we summarise as:

- Boundaries between institutions with different learning emphases.
- Boundaries between curriculum disciplines.
- Boundaries between first and second life roles and persona.
- Boundaries between face-to-face and distance education delivery methods and expectations.
- Boundaries between safety and risk taking.

**Boundaries between institutions with different learning emphases**

One of our aims in setting ILE 2008 in SL was to explore the affordances of the virtual environment as a learning and teaching platform. Our observations of the virtual environment suggested that much learning and teaching activity within SL mirrored real life classroom activity. We were aware of many replica classrooms and lecture theatres, and had observed, or participated in, learning activities which mirrored real life tutorials or seminars. Although we knew there were educators seeking to push the boundaries in SL, we were interested in how students would approach the environment. Our hope was that they would be unencumbered by the baggage of teaching experience we carried, and might be free to engage in more innovative activity than professional educators.

Although we were happy to give our students a problem and a blank canvas, not all of our clients were happy with this freedom. In vocational education there is considerable emphasis on skills development and preparation for work. Although we had emphasised to our clients that we wished them to present our students with a problem scenario only, several of our clients found it difficult not to present possible solutions. While our emphasis was on process - and we told the students that in some cases they might not find an appropriate solution - many of our clients had an emphasis on product, and in some instances had very clear ideas about what they expected students to build for them. This led to frustration for both students and teachers, and involved the ILE 2008 staff in troubleshooting between the students and clients.

The staff team was drawn from different institutions. Although we shared a similar vision for what we wanted from ILE 2008, there was a need to clarify differences in institutional practice and expectations. For example, marking scales were markedly different with a bar at 70 for a first class pass in one institution and at 85 in another. Although the expectations were similar, the quantitative measure of those expectations was very different.
Boundaries between curriculum disciplines

Although students had a wide range of backgrounds, they were being asked to work with clients in curriculum areas about which they had little or no knowledge. We regarded this as a reasonable requirement, as IT professionals frequently have to work with colleagues with different areas of expertise and have to demonstrate understanding of these different fields in developing solutions. Although many of the students demonstrated an ability to grasp the nub of the problem quickly and to clarify their understanding through the project specification, some found it extremely difficult, verging on impossible, to understand the nature of the problem and to respond to it in a meaningful way.

ILE 2008 was a relatively short course, running over 10 weeks, and on reflection we expected a great deal from our students. Not only were we asking them to familiarise themselves with a new environment, Second Life, but we were asking them to gain an understanding of an unfamiliar discipline and to propose a solution to a problem, which clients had already defined as presenting difficulties in real life teaching contexts. In general, our students are to be congratulated for the alacrity with which they addressed the problems they were assigned.

Boundaries between first and second life roles and personas

In most education settings, the role of the teacher and the role of the learner are clearly understood. Although teachers will frequently learn from their pupils, they are regarded as having some knowledge and expertise, which they impart in various ways. Teaching normally takes place in formal settings such as classrooms and lecture theatres. Students are able to consult with their teachers at predetermined times.

In ILE 2008, the usual rules of staff student interaction were challenged. Although the staff team had explored SL, none of them claimed to be experts in working in that environment. They were able to offer resources to students to enable them to explore and familiarise themselves with the virtual world, but rarely were they able to suggest solutions to student dilemmas. The teachers were no longer the experts with domain knowledge, but were fellow learners with the students.

Although students continued to attend formal classes and were offered consultation in predetermined office hours, much of the interaction between students and teachers took place in the virtual world. Some of these interactions were by appointment, but many took the form of chance encounter, or were initiated by the students. For example, a student noticing a member of staff was inworld might offer a teleport to their location so that they could discuss the building activity in which they were currently engaged. Similarly, members of staff spent time in the location students were working in and would engage in conversation as to project progress. As well as these project focused discussions, on occasions staff found themselves simply chatting with students while sitting in treehouses and other unlikely places.

Students quickly learned to use other sources of expertise available in the virtual environment, and freely shared these with their teachers. On one memorable occasion, one team was offered considerable support by a lecturer from another institution, who provided the students with skates in recognition of their work. From then on, those students were rarely seen in SL without skates. At times, the experience was surreal.
Boundaries between face-to-face and distance education delivery methods and expectations

ILE 2008 was delivered in a traditional face-to-face classroom. Classes were timetabled on a weekly basis, students met each other in class and some of the teamwork took place on campus. The course was supported by a Moodle site, with links to reading and other resources. Each project group was also given a wiki, and encouraged to make use of it for collaboration and resource sharing.

One member of the staff team was more familiar teaching distance students using online resources. She had a number of preconceptions, of which she was quickly disabused, that students in a brick university would be far more familiar with working together, would frequently interact, and would experience little difficulty in arranging to meet together to plan their projects.

Some aspects of the course were delivered online, primarily the building tutorials which took place in SL. Use was made of videoconferencing in a variety of ways: some of the client interviews took place using videoconferencing or Skype, one of the staff team attended some of the classroom discussions using a video link, and the staff team communicated regularly using Skype and e-mail with minimal face-to-face contact. Without the casual interaction that might occur ‘around the water cooler’, members of the staff team had to rely on the skills each member of the team brought to the project and a high level of trust quickly developed. This was reinforced by using the available communication channels and engaging in email conversations.

Boundaries between safety and risk taking

The first presentation of any new course carries with it a degree of risk. In general, this risk is mitigated by the experience of teaching staff and the ability to change elements of the course in response to student need. It is usually possible to identify in advance the parts of the course which are likely to be problematic.

ILE 2008 had a number of potential risks. The course was using a virtual environment, which neither staff nor students had expertise with. Although the staff team had met to plan the course, they had not worked together as a team before and did not know each other’s strengths and weaknesses. In deciding to look for clients from the SLN partner institutions, it was unclear whether clients would be forthcoming and whether they would be able to offer projects appropriate to the course. Students were being asked to undertake a number of untried and untested tasks including working with an external client, developing a learning experience within SL, creating a machinima and presenting the outcome of their work within a ten week timeframe. In addition, students were being asked to engage in group work, and that group work would be assessed.

The virtual environment of Second Life presented its own risks. From a technical perspective, there was a need to ensure that access to SL would be available on the University network, that the SL software would run on University computers and that software updates would be installed as needed. A further area of risk was uncertainty about the stability of the SL platform, and how downtime might affect the work of students.
Students needed to be introduced to SL and made aware of some of the risks inherent within the virtual environment. The staff team discussed at length how we might appropriately fulfil our duty of care to the students. Although it could be argued that, as a rule, we are unaware of what students do in their lives outside the real life classroom, it is also true that we do not ask them to do any particular activities in their lives beyond the classroom which would lead them into personally risky situations. In this instance, we were asking the students to engage in activities in SL, and we were aware that they might have encounters which they might find embarrassing, challenging or threatening. The written material introducing students to the course included information about how to register an avatar and alerted students to the risks in SL, providing strategies for avoiding, or if necessary escaping from, situations where they felt vulnerable or at risk. Although some risks might have been mitigated by purchasing our own island, we felt it was important for students to explore the affordances of SL for themselves.

In mitigating the risks, our main concern was to ensure that the students knew that we were asking them to engage in a high-risk project and to make them aware that the assessment criteria were not dependent on successfully creating a solution to their client’s problem within the SL environment, but on the students’ reflections on the process and outcomes. This was particularly important for the third year undergraduates, who were coming towards the end of their university studies, and inevitably were concerned to achieve the best possible degree classifications.

4. The diffusion of innovation model and its applications to education

In designing the course, we were mindful of a number of different learning theories underpinning our planning, including constructionism, problem based learning and threshold concepts. We have reflected on ILE as a case study in problem-based learning (Good et al, in press) and have plans to explore further the contribution of learning and teaching in the virtual world to threshold concepts and troublesome learning.

In considering boundary issues, we have found Rogers’ (1962) diffusion of innovation model helpful, together with the extensions to this model offered by Geoghegan (1994) and Moore (1991). Rogers suggested that individuals will adopt new technologies or innovations at different rates, dependent upon their social and psychological characteristics. He identified five categories of adopters along a continuum, namely innovators (2.5% of the population), early adopters (13.5%), early majority (34%), late majority (34%) and laggards (16%).

Geoghegan (1991) applied these categories to categorise educators as follows:

- **Innovators (“techies”):** individuals who are interested in the technology itself and understand the hardware and software requirements;

- **Early Adopters (“visionaries”):** individuals who explore new technologies as a way of expanding the range of available methods of teaching effectiveness; they are risk-takers who apply an interdisciplinary approach to teaching, learning and research.

- **Early Majority (“pragmatists”):** individuals who are willing to adopt new tools in order to stop all the day-to-day problems of teaching and research. They
listen to the success stories of colleagues. Generally pragmatists are more risk-averse and less likely to cross disciplinary boundaries.

- Late Majority ("sceptical"): educators who adopt well-established technologies, which come as complete packages with support. They tend to have little interest in technology.
- Laggards: these may be considered the Luddites of instructional technology and are unlikely to adopt technology, except under pressure.

Moore (1991) suggested there is a chasm between early adopters and the early majority, and bridging this chasm determines whether or not a technology moves into the mainstream. The characteristics of the Early Adopter and the Early Majority are listed in Table 1. Jennings and Collins (2007, p. 181) draw attention to ‘striking differences between these two groups’ and suggest that there is ‘an opportunity to examine the early adopters and early innovations to discover those aspects that may appeal to the early majority in anticipation of widespread use’ of virtual worlds. We would suggest that in a learning and teaching context at the present time, teachers are more likely to be characterised as early adopters and students as early majority, but there is scope for movement between the groups, suggesting the existence of a continuum rather than a chasm. It may well also be that viewing teachers as early adopters and students as early majority has less to do with their overall comfort with virtual worlds, and more to do with issues of control. Indeed, students may be very “au fait” with virtual worlds and other such technology-based innovations, but are rarely in a position to implement changes in a formal teaching and learning context.

<table>
<thead>
<tr>
<th>Early Adopter</th>
<th>Early Majority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favour revolutionary change</td>
<td>Favour evolutionary change</td>
</tr>
<tr>
<td>Visionary</td>
<td>Pragmatic</td>
</tr>
<tr>
<td>Project oriented</td>
<td>Process oriented</td>
</tr>
<tr>
<td>Risk takers</td>
<td>Risk averse</td>
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<tr>
<td>Willing to experiment</td>
<td>Want proven applications</td>
</tr>
<tr>
<td>Generally self-sufficient</td>
<td>May need significant support</td>
</tr>
<tr>
<td>Horizontally connected</td>
<td>Vertically connected</td>
</tr>
</tbody>
</table>

Table 1 Characteristics of early adopters of technology and early majority.

5. Application of the Diffusion of Innovation Model to ILE 2008
As researchers and educators, the staff team of ILE 2008 could be considered early adopters. Within the team there was considerable technical expertise, a willingness to take risks, and an active interest in exploring the affordances of SL. There was an
awareness of the potential risks and a willingness to mitigate these in various ways. We were interested in experimenting and learning from the experience in developing future courses.

Although there was some evidence from students on previous ILE courses that they wished to work with cutting edge technologies, in general, the student group were risk averse and focusing on results. In many ways, this was understandable, given the particular stage in their learning journey, and the general culture which often surrounds learning in higher education. However, as learners, they were interested in new knowledge and acquiring new skills provided sufficient support was given. In essence, although their risk-averse stance was understandable, as a staff team, we aimed to overcome this by limiting the negative consequences that can be associated with risk taking, and by encouraging students to explore creative solutions necessitating a degree of risk taking and challenging personal boundaries. That this approach was successful with some students is evidenced by a student’s comment on the course evaluation questionnaire: “It has opened new doors to an entirely different field of computing, which is very interesting, and the course has made me realize that there is so much potential out there to do anything you can think of!”

The project clients were educators, who would not have considered adopting SL as a learning and teaching environment on their own, but who were interested in knowing more about what SL might offer them as long as they themselves were not asked to take any risks. They would probably categorise themselves as members of the late majority. As a result of seeing the outcome of the student projects, some of the project clients are wanting to develop and use the projects with their students. Whether they would want to take a step further and initiate their own projects in SL is still to be determined.

Geoghan’s (1991) model provides a useful framework in embarking on any learning activity with a substantial use of technology. By understanding that the different participants are individually at different places on the technology adoption continuum, it makes it possible to identify and address concerns.

The recognition that a student who might be an ‘innovator’ or ‘early adopter’ in their personal approach to technology can be far more cautious when engaged in an assessed learning experience is an indicator to educators to clarify the purpose of the learning activity. If there is a product focus, for example, learning how to use a piece of software in order to produce a specified product, then it is necessary to overcome the anxiety and focus on the task and the product. If, on the other hand, the learning experience is more about exploring and experimenting what might be possible, the focus is on the learning process and the student’s own developing understanding, requiring a different type of assessment and different input from teachers.

To some extent, most, if not all, formal learning experiences include elements of both product and process. However, as we found from our interaction with colleagues from different institutions, the relative importance of product and process can be very different. It is perhaps inevitable that a product focus leads to a more risk averse stance, and even a resistance to exploring a new technology altogether – if it’s not broke why fix it. There is a need to clarify the relative importance of product and
process, especially if we are working with colleagues who may have a different stance.

The following diagram (Fig 1) is offered as a somewhat tentative tool for assessing the stance of different participants in a new technology learning experience and shows the journey we anticipated students would make during ILE 2008.

![Figure 1: Relationship between willingness to take risks and focus on learning process or product](image)

**Fig 1 Relationship between willingness to take risks and focus on learning process or product**

Although Moore (1991) associates project orientation with the early adopter and process orientation with the early majority, we would suggest that in a learning context, our experience and observation might indicate that in designing learning experiences, the risk taking early adopter may have a greater investment in the learning process, while the more risk averse focus more on products resulting from the learning experience.

### 6. Conclusions

On reflection, we took a lot of risks embarking on ILE 2008 and learned a great deal whilst doing so. Although the open-ended nature of the experience was unnerving at times, for both staff and students, the students rose to the challenge and far surpassed any of our expectations in the projects they presented to us and to their clients. Although working in partnership is not always easy, the boundaries and difficulties present challenges and opportunities leading to new learning experience for all engaged in the process.

We have found the diffusion of innovation model useful in understanding some of the challenges we faced, and suggest some refinements to the model for application to the relationship between risk orientation and product/process in learning and teaching in technologically rich environments.
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