Choosing virtual worlds for use in teaching and learning in UK higher education

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"I look at a project and see *if* a virtual world might suit that project. If a virtual world does suit that project, then I think *which* virtual world would suit the project best" - Fiona Littleton

"It's not the technology per se, it's what you do with it." - Kathryn Trinder

"No platform seems to offer a perfect mix of options, security, and population of others. In this sense picking a world to use with students is very much about deciding what areas you are willing to compromise and what areas you are not." - Michele Ryan

"We tend to look at virtual worlds with a project in mind already, so suitability for that project (be it distance learning, human computer interaction practicals, virtual fieldwork, or something else) is our main criteria." - J Ross Nicoll

Overview

Summary

Virtual World Watch asked previous respondents to snapshot reports – UK university and college academics who develop and use virtual worlds – what worlds they used and why they chose them. Second Life and OpenSim were mentioned or used by most respondents.

Second Life is attractive due to its constant development over six years, there is no need to acquire a server or significant local technical support, the large community of experienced practitioners, and the variety of already-created objects and structures that can be quickly re-used cheaply or for free.

OpenSim is attractive because, compared to Second Life, 'land' does not carry the same expense, there are fewer security issues, there is no dependence on a single commercial vendor, and it is easier to configure how private your environment is; content can also be ported from Second Life.

Apart from Second Life and OpenSim, over a dozen other virtual worlds or environments were mentioned; of these Metaplace and Forterra's OLIVE appeared to pique more interest and use, from an educational perspective, than the others. Some respondents had examined a range of virtual worlds. Sensibly, organisations such as St Andrews University are examining these from the perspective of the educational or project requirements, rather than the attributes of the particular virtual worlds.

Several respondents contributed their criteria lists (given in this report) for evaluating virtual worlds. A few are creating or using more complex frameworks: the Open University, for example, is developing a matrix of virtual world needs containing around 70 weighted criteria.

However, examining just one virtual world from the perspectives of teaching, learning, build, functionality, security, stability and many other criteria of importance to academics is not a trivial operation. Consequently:

1. Some academics, though they would like to examine more virtual worlds, tend to default to examining just one or two options due to a lack of time/resource. Usually, Second Life or OpenSim is one or both of these.

2. Many UK universities are, independently of each other, examining a range of virtual worlds. This time- and resource-consuming operation results in a significant amount of duplicated activity across the sector.

Recommendations

1. It would assist other academics in making a more informed choice, and reduce the significant amount of duplicated activity across UK higher and further education, if institutions would **<u>rapidly</u>** disseminate their virtual world comparative findings. As virtual worlds are being developed at an extremely fast pace, the traditional academic timeline for dissemination is of no use; a matter of weeks, rather than months or later, and such information becomes outdated.

2. A number of similar responses indicate a common need for an OpenSim – or similar – platform for current and prospective virtual world users and developers in UK higher education who do not have server and technical resources. As well as providing a low-cost environment with relatively high (and configurable) security and privacy, such an option provides a 'back-up solution' for previous and ongoing work created in worlds such as Second Life. Whether this could, or should, be provided by an academic institution or consortium, or by a technology services company, is a debatable point; ReactionGrid appears to go someway towards this requirement

1. Background

1.1 The purpose of this report

Previous snapshot surveys[1] by Virtual World Watch have focused on *who*, in UK universities and colleges, is doing *what* with virtual worlds. This particular survey takes a step back and asks *why* some of the previous respondents are using the virtual worlds that they do.

At first glance, it would appear that the large majority of virtual world developers and co-ordinators in UK higher and further education are solely using the Second Life virtual world. However, there has always been a yearning by some respondents to see what other worlds there are, and to compare and contrast them.

This is not a trivial exercise; as the JISC Serious Virtual Worlds Scoping Study[2] points out, "There are considerable challenges for the education and training sectors, such as how to select virtual worlds."

Some UK academics, with the resources to hand, can manage to compare and contrast a selection of virtual worlds to some degree. Fiona Littleton[3] is one such academic:

"Before Second Life we used Palace, Active Worlds and There. Since Second Life we have kept an eye on as many virtual worlds (testing, using, developing) as possible - something like 13 virtual worlds over 3 years - now it is mainly the relaunched Active Worlds, Open Sim (which we have been testing with Austin Tate, Informatics) since 2006, and also browser-based systems like There, Metaplace and Habbo Hotel.

We did not want to be tied to one virtual world only and wanted to keep testing new worlds to see if they were more suitable to our needs as a programme[4]."

Others cannot, or do not, with many defaulting to using Second Life.

The snapshot survey and report of October 2008[5] indicated more academics experimenting with a range of virtual worlds, rather than taking the 'MSL' (Monogamously Second Life) approach. Post-report debate crystallised into two questions:

1. How can an academic individual, group or body either compare two or more virtual worlds, or determine which is 'best' for a specific teaching and learning need?

2. If academic developers who used Second Life were given more resources, would they move to a different virtual world or stay with Second Life?

For this report, Virtual World Watch asked variations on these questions to previous contributors of snapshot survey reports. Hopefully, this report will therefore be useful to those:

1. Considering how to compare virtual worlds for a specific educational need.

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[1] Previous survey-based reports can be found on the Virtual World Watch website: http://www.virtualworldwatch.net/

[2] JISC Serious Virtual Worlds Scoping Study (2008) Serious Games Institute. http://www.jisc.ac.uk/media/documents/publications/seriousvirtualworldsv1.pdf

[3] Fiona Littleton, Associate Lecturer, School of Education, University of Edinburgh.

[4] MSc in E-learning programme, University of Edinburgh: http://www.education.ed.ac.uk/e-learning

[5] "Second Life is not the only fruit." Autumn 2008 Virtual World Watch snapshot: http://virtualworldwatch.net/2008/10/17/second-life-is-not-the-only-fruit/

2. Short on time for comparing virtual worlds and wanting to quickly eliminate many possibilities.

3. Curious as to which virtual worlds other academics have examined or evaluated.

4. Interested in the pros and cons of using the two most popular virtual worlds in UK higher education, namely Second Life and OpenSim.

It should be stressed that, as with evaluating any other complex technologies and software, there is no 'golden bullet'. People wanting, in a few minutes, to find a virtual world that truly meets all their educational needs, taking into account their individual resources, technical capabilities and skills, will be disappointed.

1.2 Defining virtual worlds

Responses to the survey that forms the bulk of this report indicate that perceptions differ as to what a 'virtual world' actually is. A few of the responses included mentions or descriptions of systems that were *arguably* not virtual worlds. The terminology itself is also debatable: 'metaverse' and 'synthetic world' are two terms that are often used in place of 'virtual world'.

Even some academics who have been users of widely recognised virtual worlds, such as Second Life, over several years were unsure of what constitutes a virtual world. The increasing ability to modify some worlds and to add components (offering virtual world attributes) to non-virtual world systems muddies the waters further.

For the purpose of this report, it was felt necessary to adopt a definition as to what is and is not a virtual world.

Yesha Sivan describes virtual worlds[6] as consisting of four components: "Ultimately, real virtual worlds arise from the integration of 3D, Community, Creation and Commerce." Meanwhile, Ralph Schroeder briefly discusses[7] the evolution of the term, and how online games are a distinguishable subset of virtual worlds. He notes that:

"I have argued for more than ten years for a clear definition of virtual environments and virtual reality technology as *a computer-generated display that allows or compels the user (or users) to have a sense of being present in an environment other than the one they are actually in, and to interact with that environment*[8]; or, in short, 'being there'."

He continues:

"The difference between virtual reality or virtual environments as against virtual worlds is that the latter term has been applied to persistent online social spaces; that is, virtual environments that people experience as ongoing over time and that have large populations which they experience together with others as a world for social interaction."

Mark Bell analyses the terminology in more detail[9], providing a combined definition including five attributes which also includes the element of persistence:

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6 Sivan, Y. (2009). Overview: State of Virtual Worlds Standards in 2009, 2(3). http://journals.tdl.org/jvwr/article/view/671/539

7 Schroeder, R. (2008). Defining Virtual Worlds and Virtual Environments. Journal of Virtual Worlds Research, 1(1). http://journals.tdl.org/jvwr/article/view/294/248

8 Schroeder, R. (1996). Possible Worlds: The Social Dynamic of Virtual Reality Technologies. Boulder: Westview Press.

9 Bell, M. (2008). Toward a Definition of "Virtual Worlds". Journal of Virtual Worlds Research, 1(1). http://journals.tdl.org/jvwr/article/view/283/237

1. Synchronous communication, necessitated by shared activities.

2. Persistence: the world continues to exist and function when the user/player is not there.

3. Network of people. People communicate and interact with each other and their environment.

4. Representation by avatar. This is a digital representation that has 'agency' (the ability to form actions) and is controlled by a human in real time.

5. Facilitated by networked computers.

This five-attribute definition is clear and understandable, and was used to select appropriate survey responses for inclusion in this report.

1.3 Comparing virtual worlds

If we follow the definition previously given, there are many virtual worlds of which an indeterminate subset have potential use in education. Virtual worlds are being developed and eliminated at a rapid rate. Wikipedia does not have an index for virtual worlds, but lists 66 pages for 'virtual reality community'[10], most (but not all) of which are arguably stand-alone virtual worlds. Yesha Sivan quotes[11] 'more than 100 other worlds'.

To complicate matters, virtual worlds are not entirely mutually exclusive. The popularity of OpenSim rests, in part, on the ability to transfer content between it and Second Life, thus providing a backup or alternative solution. Development by some of the major providers of virtual worlds, such as Linden Labs and IBM, in moving content between worlds, is ongoing[12].

Even when an academic has a stable list of virtual world options, the criteria for comparison can be complex. Searches online reveal various comparisons, though the quality and depth are variable and methodologies or rationales are not often given. The Virtual Environments website contains a chart[13] from August 2007 comparing 15 virtual worlds. 'Education ready?', defined as "The ability to utilize the virtual environment for educational purposes, such as to teach subject matter", is one criterion. The Compare Virtual Worlds blog compared 11 such environments in July 2008[14], using a wider range of criteria, though none with an educational focus. In 2005, Oz Spade compared[15] just Second Life, There and Active Worlds, while in May 2009 Rezzable.com produced a more thorough comparison[16] of Second Life and OpenSim.

Available comparison frameworks of academic robustness are smaller in number. Sarah Robbins, as part of her PhD research, undertook a facet study of around 60 virtual worlds.

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[10] Wikipedia index page for Virtual reality communities: http://en.wikipedia.org/wiki/Category:Virtual_reality_communities

[11] Sivan, Y. (2009). Overview: State of Virtual Worlds Standards in 2009, 2(3). http://journals.tdl.org/jvwr/article/view/671/539

[12] IBM and Linden Lab Interoperability announcement: http://is.gd/4ponS

[13] Virtual Environments comparison chart of virtual worlds: http://www.virtualenvironments.info/virtual-worlds-comparison-chart

[14] Compare Virtual Worlds comparison of 11 virtual worlds: http://comparevirtualworlds.blogspot.com/2008/07/comparison.html

[15] Oz Spade's comparison of three virtual worlds: http://oz.slinked.net/comparechart.php

[16] Rezzable.com comparison of Second Life and OpenSim: http://rezzable.com/blog/rightasrain-rimbaud/comparing-opensim-second-life

From this, she has made an extremely useful Google spreadsheet of her data available online[17]. Maged N Kamel Boulos[18] recently advised one of his PhD students to consider formally comparing virtual worlds and devising a comparative framework:

"Since you are exploring different virtual world platforms (I suggest you also consider OLIVE, if you have the time), why not consider/develop some simple virtual worlds comparison framework. You can later use such a framework to formally justify/provide a plausible rationale for any final platform choice you will be making during the course of your project.

I am not suggesting that you spend your time developing a multi-faceted/multi-axial comparison framework (this could make a whole PhD on its own), but just to 'think loudly' (and formally) about your preferences and decisions you make (and why) when exploring different platforms and choosing among them.

The actual comparison between today's platforms would be of very little or no practical value in 12 months time. For example, SL is now acquiring a universal multimedia plugin technology (cf. Metaplace) and we won't be limited to QuickTime in the near future. Technology changes very rapidly but the frameworks of comparison hold for longer and can usually be reused with little or no modification in future exercises dealing with newer versions of a technology.

One thing you can include in your mini-framework, and base part of our choice/decision on, is the immersiveness or 'immersive affordances' of a given platform (a more sophisticated comparison framework could well look into developing its own 'immersiveness scale' for this purpose). For example, the mostly 2.5D Metaplace is far less immersive than Second Life and clones. If immersiveness constitutes an important factor in the delivery of your material then you should be investigating this."

It was interesting to see that hardly any of the respondents to the survey used a comparison framework, though one respondent for the Open University indicated one under development. However, as section 2 shows, a number of respondents did have a list of criteria for application to virtual worlds.

1.4 Methodology for this survey

In September/October 2009, Virtual World Watch listed respondents to the last three snapshot reports and, where possible, sent them three questions. These questions were based around the 'default' virtual world of Second Life – so labelled as it is the one used by the majority of respondents, either solely or as one of a range of virtual worlds. The questions were:

1. Have you considered virtual worlds other than Second Life for use in your academic work? If so, which ones?

2. Why did you decide to go for them – or, decide, not to go for them?

3. What were your criteria for either comparing virtual worlds (with each other and/or Second Life), or seeing how suitable they were for your teaching and learning purposes?

The questions were phrased to 'smoke out' people using virtual worlds other than Second Life. This isn't an anti-Second Life stance; Virtual World Watch takes a neutral view on virtual worlds and how they are used. Rather, it is to focus attention on worlds other than the dominant market leader. Respondents to the survey commented on 14 identifiable virtual worlds, though three replies were not included as they fell beyond the scope of what a virtual world is.

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[17] Virtual Worlds Facet Study, by Sarah Robbins: http://is.gd/3PtmL

[18] Dr Maged N Kamel Boulos, Senior Lecturer, Faculty of Health, University of Plymouth.

As with all of the Virtual World Watch surveys, it should be borne in mind that this report does not show a comprehensive body of views. Some academics using virtual worlds remain undetected and unaware of the surveys and reports. Some others decline to respond for a variety of reasons, including time, privacy and departmental and institutional politics; some have promised to reply for the follow-up report instead.

1.5 Follow-up report

Virtual worlds are appearing, maturing/enhancing and disappearing at a rate with which it is difficult to keep up. This alone presents problems for academics looking for a stable platform that they can plan and integrate into an academic year.

A follow-up to this report is planned to be released in four months, around mid-February 2010, on the Virtual World Watch website. It will be interesting to see if new virtual worlds with educational potential have emerged by then, and which existing ones have improved. Input from UK academic users of virtual worlds, and developers of such environments specifically for the UK academic sector, are welcome.

1.6 Attribution and re-use of this report

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• The context is not changed.
• The report/Virtual World Watch (www.virtualworldwatch.net) is acknowledged.
• Any respondent who provided the content/quote is acknowledged.

Virtual World Watch is unable to provide further contact details for the respondents quoted within this report. Should you contact any, then please remember that most are busy academics; be open about the purpose of your enquiry, and say that you found their quote in this report. Thank you.

1.7 Acknowledgements

As ever, this document would be rather shorter were it not for the time and input of many virtual world practitioners in UK universities. Thank you to all of you who responded.

My thanks to various academics for some extra pointers, Scotproof[19] for proofreading, and the frank but always useful discussions with Andy, Ed and Pete from the Eduserv research team.

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[19] Scotproof proofreading: http://www.scotproof.com/

2. Determining which world is 'best'

2.1 Lists of criteria

Some respondents listed criteria for determining which virtual worlds suited their needs.

Judy Robertson[20] gave "six criteria:

- What I could get installed and supported without huge and exhausting fights with the computing officers.
- Price (although we ended up paying for our island we weighed up the cost of the extra support time for OpenSim against this).
- End user programming is a must for us.
- Learning materials available to support students.
- Multiuser virtual environment with user generated content support.
- Support from other educators who have done something similar."

Anna Peachey[21] outlined a useful-sounding set of 70 weighted criteria at the Open University:

"We have created a matrix of virtual world needs, weighted according to importance, and are assessing all major open virtual worlds against those requirements – we will then look in more detail at the top three to come out of the process and use that to pull together a medium to longer term strategy for our presence in virtual worlds.

We are approaching our assessment from what we need of a virtual world for educational purposes rather than what is on offer, hence we are using the needs matrix in order to eliminate the majority. When we are exploring our top three in more detail we will hope to get a picture of what they expect to offer in the future as well as what they offer now, because we know that there won't be one solution right now that meets all our criteria.

We have around 70 weighted criteria – we'll publish them once we have completed our report."

The virtual worlds research team[22] at the University of Ulster listed their criteria "for use of virtual worlds:

- Release stage.
- Documentation.
- Accessibility.
- Usability.
- Expandability.
- Number of users.
- In-world tools for building and scripting hardware.
- Maintenance requirements.
- Security and firewall issues.
- Required expertise."

Remy Olasoji[23] outlined the criteria for virtual world selection at the University of East London:

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[20] Judy Robertson, Department of Computer Science, Heriot-Watt University.

[21] Anna Peachey, Eygus Ltd for The Open University.

[22] Michael Callaghan and Kerri McCusker, Serious Games and Virtual Worlds research team University of Ulster, Magee.

[23] Remy Olasoji, Learning Materials Developer, University of East London.

"The criteria included cost, current uses in education, features, compatibility with existing systems, and ease of use."

Dave Taylor[24] from Imperial College London listed the criteria for their teaching and learning requirements:

"These have varied by project but include:

- Accessibility.
- Administrative overhead.
- Assets and ease of asset development.
- Scriptability.
- Voice and text communications.
- Age range considerations.
- Need for a public space or private spaces.

Being part of a larger inter-disciplinary community (the SciLands) has been a great benefit in terms of learning and knowledge sharing on best practices."

David Jukes[25] provided three main criteria:

"Usability, ease of access to software, stability of the system. Second Life was not all that stable back in 2006 when I first started."

Peter Miller[26] listed six criteria he finds important for virtual world use "in his work:

- Ease of implementation.
- Ease of content creation in-world by staff and students.
- Availability of content and tools.
- Stability.
- Availability of training and contractors.
- Active education community."

Mark Childs[27] recently compared Active Worlds Europe and Second Life for a particular need:

"The criteria were (in order of importance):

- Ease of navigation --> tie.
- Installation ---> Second Life wins (I had issues with getting the AWE viewer installed, but no-one else has).
- Availability of in-world content ---> Second Life wins.
- Ability to personalise avatar ----> Second Life wins.
- Ease of building ---> tie (I suppose) but I have more practice with Second Life.
- Removing exposure to adult content ---> AWE wins.
- Resource requirements ---> AWE wins.

So overall I think both have strengths and weaknesses, but Second Life won on the things that were important to me."

24 Dave Taylor, Programme Lead, Virtual Worlds and Medical Media, Imperial College London.

25 David Jukes, Senior Lecturer, School of Animal, Rural and Environmental Sciences, Nottingham Trent University.

26 Dr Peter Miller, School of Biological Sciences, University of Liverpool.

27 Mark Childs, Teaching Development Fellow, Faculty of Engineering and Computing, Coventry University.

Peter Twining[28] listed seven drivers for determining the viability of a virtual world for his teaching and learning requirements:

- "More control over service levels.
- Greater control over the ages of people who can access the virtual world (younger than 13 – more mixing of ages across the child/adult boundary).
- More control over access (who can get where when) – and/or fewer limits about number of users and prims.
- Greater recording of 'actions' by users.
- Greater integration of web browsing functionality in-world – real functional browser in-world.
- Better quality graphics/physics engine.
- Greater future expansion capabilities (futureproofing)."

Annabeth Robinson[29], who teaches a degree course in digital film, game and animation, has five criteria associated with user generated content:

"A virtual world, for our course, must support UGC (User Generated Content):

- At most basic , the import and display of images.
- The ability to stream your own media / either video or audio.
- The design of 3D content, via inbuilt tools or import of 3D meshes.
- Script your own interactivity.
- An active community / audience."

2.2 On choosing a virtual world

Several respondents put more emphasis on one or two particular aspects of virtual worlds, while others took an education or project-centric approach.

Build quality was a key criterion for people such as Dave White[30]:

"We knew we wanted something with very good building capabilities so Second Life and OpenSim it was. If we didn't need to build so much I would have considered 'There'. I also looked at Croquet (too alpha) and Real Extend (which was too beta at the time but looked good)."

Kathryn Trinder[31] argues that the focus shouldn't be on the world, but on the educational requirement:

"Pedagogy wise I really don't think platform matters all that much – it's the old chestnut of Blackboard or Moodle, Internet Explorer or Firefox, iPod or MP3 player. It's about people's 'perceptions', and misperceptions can just stick or freeze people into not trying things, into being negative. It's not the technology per se, it's what you do with it."

Michele Ryan[32], after comparing Active Worlds and Second Life, finds that the weight given to criteria is up to the individual:

"We find that suitability is relative. Second Life has many technical challenges, but offers more variety. So it was really a matter of balance. No platform seems to offer a perfect mix of

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[28] Dr Peter Twining, Senior Lecturer, Department of Education, Open University.

[29] Annabeth Robinson, Year Tutor, Digital Film Game and Animation, Leeds College of Art.

[30] David White, Senior Manager (Development), Department for Continuing Education, Oxford University.

[31] Kathryn Trinder, Glasgow Caledonian University.

[32] Michele Ryan, Research Student, Management School, Lancaster University.

options, security, and population of others. In this sense picking a world to use with students is very much about deciding what areas you are willing to comprise and what areas you are not.

For us, having access to a wider population (not associated with us) was a high priority. We were willing to give up the idea of having an enclosed world that was secure and controllable in exchange for being able to communicate with the general public (and being able to find a large population of people)."

The authenticity of what can be created in a virtual world, plus a community of collaborators, are key factors for Anne Cunningham [33]:

"I would use any virtual world that could be used for an authentic simulation of the real world of a working pathology laboratory/hospital. Open source is much more appealing and if there was a critical mass of like minded people to collaborate with, I would be interested. I think the user experience for students engaging in it is important, so if it is easy to navigate and there is other good content that would encourage them to go in – brilliant."

Ian Truelove's criteria [34] rested on matching the world to the students' needs, and the technology coping with mass student use:

"My criteria for deciding on the suitability of different virtual worlds is determined by the needs of an art or design student studying on a predominantly campus-based, practice-led undergraduate course.

The other major factor in my decision making process is the ability for the technology to facilitate the large numbers of students that I manage. If something takes 10 minutes to configure per student, that's 60 hours of configuration for just one course. If it isn't easily scalable, I haven't got time. The amount of time and support required just to get students signed up to Second Life is stopping me from rolling it out across the course.

I think that the semi-automatic pre-configuration of a virtual world, using existing student ID databases, would enable me to scale up the use of virtual worlds, as well as giving student a much more meaningful first experience.

Many undergraduates have invested a great deal of time and effort in forging social bonds with complete strangers. A tool that allows them to reinforce those bonds is more meaningful to them than one that either turns their friends into strangers, or places them into an environment full of strangers. The real potential for alternatives to Second Life is control over identity to benefit learning."

Ferdinand Francino [35] takes a different viewpoint on comparing and selecting virtual worlds:

"I didn't so much compare [virtual worlds]. I don't think OpenSim should be classified as 'other than Second Life' but rather as 'open source near-equivalent of Second Life'. I think OpenSim (with Hypergrid[36]) is the logical evolution and has been for quite some time.

Linden Lab had announced they were going to release viewer and server code into the public domain under a public license pretty early in the game; this was (and is) essential for it's viability. Linden Lab wants a head start in a playing field that they'd like to see as big as

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33 Dr Anne Cunningham, Senior Lecturer, School of Sciences, University of Sunderland.

34 Ian Truelove, Senior Lecturer & E-learning coordinator, The Leeds School of Contemporary Art & Graphic Design, Leeds Metropolitan University.

35 Ferdinand Francino, Project Manager, CU There, GCU Web 3D & Virtual Worlds, Glasgow Caledonian University.

36 Hypergrid: http://opensimulator.org/wiki/Hypergrid

possible. They have released the viewer code but not yet the server, which they are now beta testing in a stand-alone 'behind the firewall' solution.

OpenSim sped up this projected development. IBM is using it in combination with their Lotus Sametime project branch (for a hefty fee of $50,000 for four regions); they also like a head start in a playing field they expect to be quite substantial."

The ability to use a virtual world on many platforms is an attractive attribute for Eloise Pasteur[37]:

"One of my key criteria is being platform agnostic. Small Worlds, Metaplace and Second Life all run smoothly on Macs as well as PCs and that's often my first criterion. After that, content creation tools that are simple, co-operative, reliable and stable is my next criterion. I appreciate that Metaplace may have changed since I was there last, but each time I have looked, only Second Life has passed all these tests."

The ability to run a virtual world on a Mac and a PC was also a key factor for Annabeth Robinson[38]:

"Our college computer resource is Mac based, and as the IT department are not supporting dual bootable Mac's in the near future, virtual worlds for teaching need to be Mac Compatible for us if they are to be used directly for teaching and assessment. This keeps us with Second Life predominately, and potentially Opensim.

Our resource does expand out to 3 additional high-end specced PC's which are currently running the game mod software UnrealEd3, but the build is locked down by IT, so it very hard to add additional software during term time.

Since we've been in Second Life for a few years, the finance department has been quite happy with our continued use of it. However, in this financially tight year, cost is the most important criteria of taking on any new virtual world presence. This, for now, will preclude us from exploring any further with other virtual worlds."

Fiona Littleton[39] is another academic for whom a virtual world being able to run on both the main platforms is important:

"The platform issue is a big one as a lot of teachers on the MSc are Mac users, but most students are PC users - so Second Life won for a few reasons, one of which is that it is cross platform. That way more users could access it."

J Ross Nicoll[40] looks at virtual worlds primarily from the needs of the project at hand:

"We tend to look at virtual worlds with a project in mind already, so suitability for that project (be it distance learning, human computer interaction practicals, virtual fieldwork, or something else) is our main criteria.

Beyond that, adaptability (so, if nothing suits well, can we adapt an existing virtual world – the open source virtual worlds do well here), and maintainability (how much money and time is going to be required to use the virtual world, including how much is it going to change the hardware requirements when equipping computing labs)."

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37 Eloise Pasteur, Training and Materials provider to UK universities. http://eloisepasteur.net/blog/

38 Annabeth Robinson, Year Tutor, Digital Film Game and Animation, Leeds College of Art.

39 Fiona Littleton, Associate Lecturer, School of Education, University of Edinburgh.

40 J Ross Nicoll, Research Fellow, School of Computer Science, University of St Andrews.

3. Second Life and OpenSim

The editorial[41] of the October 2009 edition of the Journal of Virtual Reality Research includes:

"Currently the Open-Second Life ecosystem has potential to turn into the standard. The co-operation between Linden and Open source work seems to advance the state of the art."

It is perhaps not surprising, therefore, that the large majority of respondents used Second Life, or OpenSim – or both. Their explanations fall into seven overlapping categories.

3.1 Some reasons for choosing Second Life

The School of Health and Social Care at UWE chose Second Life[42] for several reasons:

- "The existing educational community in Second Life.
- OpenSim gave us an exit strategy.
- It's established and working – there's lots of 'me too's' out there, but none with a compelling difference and most are quite immature.
- Relatively cheap, especially compared to commercial offerings; free for students.
- The ability to write our own scripts and call out to external web services open up interesting possibilities (I am a software developer at heart).
- In the same vein, PIVOTE[43] offered up some interesting possibilities.
- The eco-system around Second Life of designer and builders which would help us get under way quickly."

Like several other respondents, one reason Anne Cunningham[44] found Second Life attractive was the fact it was already used in her institution and throughout higher education:

"I am far more familiar with the educational applications of Second Life [than with those of other virtual worlds], and I am aware of OpenSim and Twinity – but not the others ... but a quick glance at Open Croquet looks very interesting. I am in Second Life because others in HE are, and because of existing expertise at my institution."

At the University of East London[45], several virtual worlds were considered before Second Life was chosen:

"We did consider quite a few just before we bought the island on Second Life in 2008. These include Olive, Active Worlds, There, Twinity, etc. There was a long list.

We chose Second Life over the others because of the relatively low cost at the time compared with the others. The freedom to create content was also another reason for choosing Second Life."

Sheila Webber[46] lists some of the reasons why she has stayed with Second Life:

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41 Sivan, Y. (2009). Overview: State of Virtual Worlds Standards in 2009, 2(3). http://journals.tdl.org/jvwr/article/view/671/539

42 Matthew Cownie, Head of Learning Technologies Development Unit, School of Health and Social Care, University of the West of England.

43 PIVOTE (Open Source Authoring for Virtual Learning): http://www.daden.co.uk/pivote.html

44 Dr Anne Cunningham, Senior Lecturer, School of Sciences, University of Sunderland.

45 Remy Olasoji, Learning Materials Developer, University of East London.

46 Sheila Webber, Senior Lecturer, Department of Information Studies, University of Sheffield.

- "Able to use tools developed by others.
- Networks and communities of other people that I can talk to and learn from, and which also my students can tap into.
- A variety of different regions and environments that enable learners to explore the meaning of information (and, possibly, of life).
- Business and educational involvement obvious (through builds, events etc. etc.), and visible involvement by librarians (which is very relevant to those of my students who are going to become librarians).
- Personally, I love the way I can customise myself and my environment, and tap into the creativity of the thousands of people who create things in Second Life."

David Jukes[47] finds the commercial aspect of Second Life to be a positive factor:

"Before I started I went to our ITC where they were into VR stuff and realised it would be more efficient to use Second Life as it would be under constant development due to being commercial."

Graham Steventon[48] chose Second Life so he could build a specific type of environment:

"We did consider using a Sim approach but eventually rejected it in favour of Second Life as I decided that I wanted a platform that was immersive and allowed more exploratory expression. We wanted to create a deprived environment occupied by a dysfunctional community that students could walk around and experience without the inconvenience and ethical dilemmas of a real-life field study."

3.2 Using Second Life by default

Using Second Life because it is already provided was an obvious rationale for several respondents. Lisa Whistlecroft[49] used Second Life as it was set up for her and time constraints did not allow the investigation of other virtual worlds:

"My answer is the usual one of balancing time to explore, with time to consolidate, and choosing the latter!

I got into Second Life because of the Theatron[50] project, after the stage at which the Kings Visualisation Unit had chosen Second Life as their platform. That put me in touch with other Second Life users and made me more aware of the other virtual worlds in existence and under development, but didn't give me a reason (or even an excuse) to go and explore them.

My work with PALATINE doesn't involve teaching students or designing courses so at an individual level I've got no need or incentive to widen my view. Yes, given time I'd love to but my time is justified by the work coming in, which fills it.

My personal (musical) work may take me into performance in virtual worlds but if it does I'll stick with what I know (though not enough about) rather than look for another one. So unless something pushes me into a new environment (which I'd welcome) I'm going to stick (or be stuck) with what I already know."

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47 David Jukes, Senior Lecturer, School of Animal, Rural and Environmental Sciences, Nottingham Trent University.

48 Dr Graham Steventon, Senior Lecturer in Criminology, Faculty of Health and Life Sciences, Coventry University.

49 Lisa Whistlecroft, Deputy Director, PALATINE (Performing Arts Learning and Teaching Innovation Network).

50 Theatron project: http://cms.cch.kcl.ac.uk/theatron/

Kathryn Trinder[51] at Glasgow Caledonian University summarises why she uses Second Life:

"Second Life was handy at the time; it was the most developed. Hmm, well, okay, maybe it is the technology a little – I'm just thinking about worlds such as Metaplace. I looked at that and to me it's very flat, looks like a child's game. Not 'proper' 3D etc. Also, of course, for GCU we have been handed Second Life on a plate, along with an expert developer and support, all funded by the executive. So it's there and waiting for any of our academics to pick it up and try it out. Why bother looking elsewhere..."

Another reason why Graham Steventon[52] chose Second Life is because his host institution were already using it successfully in teaching and learning:

"In terms of choosing Second Life, our institution had already subscribed to an island and there were people engaged in work in Second Life whose experiences we were able to draw on. We also developed our own pedagogical arguments to justify our approach and these were well rehearsed at our IPED conference here at Coventry, the Re-LIVE conference at Milton Keynes and the ascilite conference in Melbourne all last autumn."

3.3 Using Second Life as technical aspects are provided

While land and infrastructure in Second Life are hosted by Linden Labs, to take full advantage of OpenSim requires hosting your own land – this means hardware, good Internet connectivity and some technical expertise.

Kate Boardman[53] at Teesside University examined, then discounted, OpenSim over Second Life:

"I have followed others' experiences of them [other virtual worlds], but I was only seriously interested in OpenSim for:

- The potential to spread out over many more areas (sq. m.) than Second Life for 'cheaper'.
- Possible ways around restrictions working with college students (although this is not currently a problem for us).

Whilst OpenSim is free, it's 'free' like Moodle[54] is free, and I don't have servers, technical support or developers to install and maintain it, so it's not an option."

Judy Robertson[55] also looked at OpenSim but went for Second Life:

"We briefly considered OpenSim, but we decided no because our computing support officers don't have the capacity to support it; better for us to pay Linden Labs to maintain our island."

Sheila Webber[56] finds some attractive attributes of OpenSim but, again, it's the technical requirements that means she uses Second Life instead:

"I'm not a techie, and until someone who *is* decides to mount it, any of the options that require you to mount things on your own server are out. This goes for all the worlds that you

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[51] Kathryn Trinder, Glasgow Caledonian University.

[52] Dr Graham Steventon, Senior Lecturer in Criminology, Faculty of Health and Life Sciences, Coventry University.

[53] Kate Boardman, Head of E-Learning, Centre for Learning & Quality Enhancement, Teesside University.

[54] Moodle: http://moodle.org/

[55] Judy Robertson, Department of Computer Science, Heriot-Watt University.

[56] Sheila Webber, Senior Lecturer, Department of Information Studies, University of Sheffield.

implement yourself, but it is this aspect of having control of the environment that I would see as the advantage.

I would not see this as supplanting Second Life, in that I think that (for students in social science areas like mine) the society and economy that has grown up in Second Life are interesting and subjects of study for the students in themselves. It is, rather, that ideally I would have access to a world where I and the students had more space to play with things and learn in a 'safe' space (not that I have actually had problems with safety in Second Life, either, in fact.)"

Tony Ackroyd[57] at the University of Greenwich also indicated that a lack of technical support was one reason against using OpenSim:

"I have had a look at OpenSim, but after some discussion we didn't go with it as we wanted students to have experience with dealing and interacting with a variety of avatars, which you wouldn't get with OpenSim. Also, the set-up of OpenSim would need managing by staff and no one was willing to support this."

The technical requirements of OpenSim was one of several reasons why Eloise Pasteur[58] preferred Second Life:

"OpenSim should pass all of these, but I have never looked at it closely because I have no interest in the technical side of running a server with the necessary bandwidth for serving a sim and, in addition, I have no interest in hiding away and ignoring both serendipitous cooperation that to my mind is one of the key soft outcomes of working in Second Life.

I also have no interest in denying myself access to the range of goods that are available in Second Life already. It's often far easier and cheaper to invest a couple of hours and 10,000 Linden dollars in some fittings than build everything from scratch. I would say that, in particular, this applies to musical instruments and clothes for recent builds I've been involved in. I can push pixels to make clothes but it's a level of artistry that is pushing my limits and takes me many more hours than I usually have to spend."

Again, the server requirements of OpenSim mean that Peter Miller[59] find Second Life a more realistic option:

"I am still with Second Life. Currently I am not in a position to run (or persuade someone else to run) a server so Second Life is the simplest option, though I am pondering renting space on ReactionGrid[60]/OpenSim if funds diminish such that Second Life is no longer an option."

3.4 Using OpenSim as an alternative or backup to Second Life

Many respondents would like to use OpenSim, or are using it either as an alternative to Second Life or as part of a method of 'backing up' Second Life content.

Kathryn Trinder[61] explained the attributes of OpenSim that she prefers over Second Life:

"I'm keen on OpenSim as it seems to solve many of the (infrastructure, perceived) issues we currently have with Second Life (privacy, security, access, control of our resources, network

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57 Tony Ackroyd, Principal Lecturer in Digital Media, University of Greenwich.

58 Eloise Pasteur, Training and Materials provider to UK universities. http://eloisepasteur.net/blog/

59 Dr Peter Miller, School of Biological Sciences, University of Liverpool.

60 ReactionGrid: http://www.reactiongrid.com

61 Kathryn Trinder, Glasgow Caledonian University.

access, issues around software installation/updates). I also am so keen on this idea of the 'world on a USB' key. Okay, so learners using that would not, if not on a network, be able to communicate with the outside world, but if they are stuck somewhere with no net access then at least they can still get to their materials.

The really nice thing with this is that it solves for many of the lecturers who are not early adopters, in the immediate term, the perceived view that Second Life is problematic in so many ways. This cuts through that. "There you go, hand these to all your students and all they do is bung it in their computer and they have instant access. An avatar is ready for them, the materials are there, and that is all they need to do." This gives confidence to academics who would otherwise still be shying away from this whole thing."

David White[62] at Oxford University assessed OpenSim:

"[We] assessed the maturity of OpenSim so we had a possible 'no commercial' option. Also, more control; we could give each student their own island to begin with."

Matthew Cownie[63] at the University of the West of England saw OpenSim as an exit, backup or escape option if things were to go wrong with Second Life:

"OpenSim is interesting in that it gives us a backup plan/exit strategy. Should Linden labs go under financially we could rescue something from the wreckage and put it on OpenSim. Also, should we encounter network bandwidth problems we could run OpenSim on campus. In addition, open source projects have a good track record if they can gain traction.

Linden Labs model of hosting everything is a bit pre-internet; 'OpenSims' of each party hosting their own sim replicates the web server model and allows for massive scalability. I would gamble that OpenSim (with the right support from the likes of IBM and Intel) has the potential to overtake Second Life in the long run. Linden script is fairly limited as a language but I can take OpenSim and add whatever I want to my own sim should I want to.

So we've gone for a belt and braces approach; most of the work is in Second Life initially, but OpenSim is lurking in the background, not quite ready for prime time but capable of stealing the whole show!"

That sentiment was similar to that of the Serious Games and Virtual Worlds research team[64] at the University of Ulster:

"We looked at OpenSim as it would give us more flexibility in terms of full management capabilities, no limitation on the number of islands we could create, or on the way we could interact with the virtual world e.g. extensions to SLOODLE[65] or how we could integrate hardware into the virtual world. In addition, having full access/control of the hosting server would be useful.

We deployed OpenSim in July 2009 and ran it in standalone mode. One useful tool we found was Second Inventory[66] which allowed us to transfer over existing Second Life content into OpenSim.

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[62] David White, Senior Manager (Development), Department for Continuing Education, Oxford University.

[63] Matthew Cownie, Head of Learning Technologies Development Unit, School of Health and Social Care, University of the West of England.

[64] Michael Callaghan and Kerri McCusker, Serious Games and Virtual Worlds research team University of Ulster, Magee.

[65] SLOODLE: http://www.sloodle.org/moodle/

[66] Second Inventory: http://www.secondinventory.com

At the moment we have not used OpenSim for teaching and learning but we are planning to transfer all our existing Second Life content from our islands to our OpenSim servers to see what else we do outside the constraints/limitations of Second Life.

Overall it's really a trade off on whether you chose to use OpenSim or Second Life. On one hand you have the cost of renting Second Life Islands from Linden Labs, but in return you get a server which is maintained, updated etc. or you can set up your own server which brings its own problems. You need to provide the hardware, power, backups and have the expertise to set up, install, run and maintain it.

The other major issue relates to firewalls and security. With Second Life you have a defined set of IP numbers and ports which your IT department can probably live with. With OpenSim the problems of IP numbers and ports are exacerbated.

We will probably stick with Second Life for teaching at the moment and use OpenSim for research."

As Karla M Parussel[67] explains, the Interlife[68] project also finds different aspects of Second Life and OpenSim preferable to one other, and is therefore using both:

"On the Interlife project we plan on developing in parallel with both Second Life and OpenSim. We have two scenarios, one for users aged 18+ in which we use a Second Life island, and the other scenario for 13 to 17 year olds. We are currently using a Teen Life island for this group.

OpenSim will become essential if we use intend working with users who are younger than this. We did not realise at the time how limited a closed Teen Life estate would be. The only advantage it has over using OpenSim is that the Second Life server is considerably more mature and robust. OpenSim can take a while to recover when an error occurs.

The InterLife project makes heavy use of in-world scripting and this puts further demands on the OpenSim server. I have no doubt that OpenSim will become mature enough in time, and when it does, if the project is still continuing then we'll happily use it in preference to Teen Life.

We do have other ideas though in which we hope to use OpenSim alongside Second Life and Teen Life."

Though Sheila Webber[69] is solely a Second Life practitioner, she does offer some reasons for considering a move to a platform such as OpenSim:

"Reasons to go [from Second Life]:

- For something less technically demanding (in terms of graphics cards/processing and bandwidth) so it was easier for students to use it.
- Something where you are not counting prims.
- Something cheaper (BUT I include people costs ... I can't see that OpenSim, or other worlds requiring technical expertise and maintenance, are necessarily cheaper in those terms, until you have a much larger usage)."

At Leeds Metropolitan University, Ian Truelove[70] outlines the project-based use of OpenSim:

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[67] Dr Karla M Parussel, Department of Computing Science and Mathematics, University of Stirling.

[68] Interlife project: http://www.inter-life.org/blog/?page_id=33

[69] Sheila Webber, Senior Lecturer, Department of Information Studies, University of Sheffield.

[70] Ian Truelove, Senior Lecturer & E-learning coordinator, The Leeds School of Contemporary Art & Graphic Design, Leeds Metropolitan University.

"We used OpenSim standalone as part of the Open Habitat project pilots, and it functioned well as a prep for Second Life. I considered using some of the public OpenSim grids, but felt they were essentially the same sort of thing as Second Life, albeit more worthy.

What I really want to do is set up a private OpenSim-based space for my enrolled students to play with each other (with their real names above their virtual heads), before sending them out into Second Life in disguise. The only reason I have not done this yet is because I am too busy and I have no budget."

Clive Gould, at Bromley College, responded that they were "existing Second Life users looking into using OpenSim for a number of reasons:

- Cost advantage over Second Life.
- Advantage of having full control over your own OpenSim servers.
- As we are a College of Further and Higher Education and have a mixture of FE and HE students, Second Life presents problems with us falling halfway between the teen and adult grids.
- No problems with the distractions and mature content available in Second Life if we run a standalone grid.
- Uses same or similar clients to Second Life, so familiar environment for existing Second Life users.
- Possible to import content you have created in Second Life into OpenSim.
- OpenSim standalone requires less ports open at firewall level than Second Life."

Ferdinand Francino[71] frankly cites aspects of OpenSim such as the ease of object distribution:

"Open Simulator allows you to create carbon copies of everything you do and distribute this on a usb stick. If I want 20 x-ray machines on Second Life I'd have to either modify 20x15 scripts to talk and listen to different channels, or I'd have to distribute them over the sim in such a way that they are not in each other's range. I can also give 20 x-ray machines to 20 students on 20 usb sticks. Or 120. Or 500. They can play with it at home, don't even need an internet connection. And they can't go jump off into the disco or accidentally be confronted by some idiot with vulgar proposals. The x-ray machine is all they have. And I can still put a copy of this x-ray machine on Second Life to show the world how bloody brilliant and innovative we are.

You can use or integrate functions from external, mature, serious, programming languages, not just the Linden Scripting Language which, as everybody knows, is rather limited and crude. You have your own database, you can add fields, store information, link into and out of it, integrate with other (online) tools. There are so many reasons.

Basically, we have to stop thinking about now, next year or in three years but look at fifteen or twenty, when (teaching and learning in) a virtual university will be integrated with (teaching and learning in) the real one. Yes, sure, people say this is science fiction but they said the same thing seventeen years ago about this world wide web thing."

Because of the negative reputation of some content on Second Life, Pauline Randall[72] is considering using OpenSim for a future project:

"I'm currently looking at a project which is educational (but from a council, not educational, establishment) which would be a pain to put in Second Life because the target market would cross over between the teen and main grids. Also, the negative aspects of Second Life would probably be an issue. So if we go for that project it would almost definitely be on OpenSim in some shape or form.

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[71] Ferdinand Francino, Project Manager, CU There, GCU Web 3D & Virtual Worlds, Glasgow Caledonian University.

[72] Pauline Randall, virtual world developer, http://www.virtual-e.co.uk/

Second Life is probably still the leader in virtual worlds where you have high levels of control over content but inevitably that is going to change as others come along.

I'm also doing increasing amounts of work with the business/commercial sector and issues such as adult content apply. I can see a lot of situations where proposing that clients go onto ReactionGrid would be easier than suggesting they go into Second Life – removes a lot of the smutty jokes!"

Like several other UK academics, J Ross Nicoll[73] finds the ability to move content between Second Life and OpenSim to be advantageous:

"We're using OpenSim for hosting a large local grid of regions, primarily because we have users with existing experience with Second Life and it's easy to make the transition. The ability to copy existing content across is also a significant advantage. Other attractions of OpenSim for us include:

- The ability to deploy as many or as few regions to a single physical machine (in comparison to Second Life where the hardware per region is fixed).
- The open source codebase means we can tailor it to our own requirements.
- The possibility of forming a hypergrid with other institutions.
- The ability to extract inventory in a relatively straightforward manner (Inventory Archives, or IAR files), for coursework submission."

3.5 Using both Second Life and OpenSim

Some academics seemed happy to use both Second Life and OpenSim for their research, teaching or learning needs.

Maged N Kamel Boulos[74] has used both Second Life and OpenSim, finding them similar in many ways:

"I have used OpenSim. There is some information and screenshots of our use online[75] and details about our experience[76] in porting content from Second Life to OpenSim (and some discussion of OpenSim). OpenSim remains the closest to Second Life, and many of the early limitations are now being solved. For example, we now have voice in OpenSim using standard viewers!"

Austin Tate[77] also uses Second Life and OpenSim, after evaluating many other virtual worlds:

"We have used something like twenty other virtual environments in the last two years, including some only in beta test and not yet available to the public, but all are now not used much.

We use Second Life and OpenSim the most. A compatible viewer that works with BOTH is important. Second Inventory lets us transfer assets between them easily. OpenSim gives us opportunities for being behind the firewall, and a range of specific technical advantages.

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[73] J Ross Nicoll, Research Fellow, School of Computer Science, University of St Andrews.

[74] Dr Maged N Kamel Boulos, Senior Lecturer, Faculty of Health, University of Plymouth.

[75] A Sexual Health Sim in Second Life: http://healthcybermap.org/slsexualhealth/

[76] Toro-Troconis, M., & Kamel Boulos, M. [2009] Musings on the State of '3-D Virtual Worlds for Health and Healthcare' in 2009, Journal of Virtual Worlds Research, Vol 2, No.2.

[77] Austin Tate, Director, Artificial Intelligence Applications Institute, Professor of Knowledge-Based Systems, University of Edinburgh.

We use OpenSim on our own servers and on several grids run by colleagues – especially New World Grid[78].

The Second Life set up for Virtual University of Edinburgh (Vue)[79] is funded initially for three years, from 2007 to 2010, with support indicated beyond that period if demand exists. The OpenSim setup[80] is run by one school and shared with others. In collaboration with others we are now developing open source assets[81] linking a web-based collaboration portal with 3D virtual spaces in Second Life and OpenSim."

David White[82] from the Open Habitat project noted a limitation of OpenSim, resulting in the use of several virtual worlds:

"We used OpenSim for part of the LeedsMets bit of Open Habitat but we didn't use it here at Oxford because the students were at a distance and it was too unstable for that at the time."

Annabeth Robinson[83] has predominantly used Second Life within her college, while carrying out some limited experimentation with OpenSim:

"Currently we've got one of our studio Macs to run a local copy of OpenSim, simulating 4 islands, though it was little used beyond explaining how to install Opensim to some interested students. A few students personally installed OpenSim on their own computers, but again, beyond the thrill of installing, never got used in their assessed work. This was mainly due to the lack of initial resources, and lack of using the communication tools (when used in local mode); Opensim doesn't look appealing if you are mainly using it as an alternative software for 3D modelling i.e. you might as well be working in Maya.

Personally I see value in OpenSim, in the archiving of a virtual world project. Also, it can be locked down behind a firewall, or simply ran locally, opening up opportunities to run a virtual world in public gallery situations a bit more safely. If it does get used in this manner, it'll be used on a project-by-project basis, rather than a persistent community space. The only downside is support, and beyond myself, no one is willing to take on this technology."

However, she has made more use of ReactionGrid in her own personal development and sees potential in this Sim variation:

"ReactionGrid is a hosted OpenSim solution. Currently I'm running my own island on Reaction Grid, rather than using it with students. If anything, it is for my own Continual Professional Development, as the ReactionGrid population is quite extensively educators and a digital technology minded community. It's also quite cheap to own your own island and to try out large projects. With the Meerkat Client, its not to hard to export the geometry and textures of projects (you own) from Second Life into OpenSim.

ReactionGrid runs on a different set of port numbers to Second Life, so it's getting our IT guys to open it up, so I can access it from college. The other interest to push into ReactionGrid is that they allow student's under 18 to access the Reaction Grid. As our college is both Further and Higher Education, ReactionGrid (or similar) would allow our National Diploma Students to access a virtual world officially. Also, as these spaces grow, it allows us again to market the Digital Film, Game and Animation Course to students under 18 years of age."

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78 New World Grid: http://www.newworldgrid.com/lang/en-us

79 Virtual University of Edinburgh (VUE): http://vue.ed.ac.uk

80 OpenSim setup at the University of Edinburgh: http://vue.ed./ac.uk/openvue/

81 Open Virtual Collaborative Environment at the University of Edinburgh: http://openvce.net/

82 David White, Senior Manager (Development), Department for Continuing Education, Oxford University.

83 Annabeth Robinson, Year Tutor, Digital Film Game and Animation, Leeds College of Art.

Fiona Littleton[84] is using Second Life and OpenSim on different courses:

"Since Second Life does have accessibility issues we have always had to offer an alternative environment for teaching on our MSc and we have used 'There' (very easy to download and learn, although PC only) for the past few years. This semester (September 2009) is the first time that we have had all students successfully access Second Life - we haven't had to offer an alternative environment for tutorials - but we have still discussed other virtual worlds (OpenSim especially as some of our programme colleagues are interested).

We have also always tried to model our Second Life work around transferrable pedagogical frameworks so that we could move virtual world if necessary, if a better virtual world comes along (which am sure it will).

I am now working with a high school in Scotland on an Open Museums Project which will use the OpenSim world and we will hopefully use the Learning teaching Scotland CANVAS island. OpenSim will provide us the opportunity to work with students (aged 12-18) and teachers in a safer, secure environment."

3.6 Using Second Life while keeping a watching brief

Time and resource constraints, such as preparing courses for the next academic cycle, often result in academics having to decide on one particular world quickly. However, many of them maintain an awareness of other worlds and what fellow academics in other institutions are using.

Liz Falconer[85] and her team are happy with Second Life for now, but are keeping a watching brief on other virtual worlds:

"We in e-learning development haven't looked at alternatives to Second Life so far, mainly because of the ease of access and availability of Second Life and that we don't want to be having to do anything technical ourselves. But, I must say that with the increasing number of virtual worlds around now, I think at the end of this year when we have a number of teaching projects running in Second Life, we'll be evaluating them and might well look at other options then."

Andy Beggan[86] explains how his team at the University of Nottingham have taken a similar approach:

"To date we have only explored Second Life. We have only been using virtual worlds for a year now and became involved to explore the opportunities and learn more about what's involved in supporting developments in a 3D environment. Throughout this time we have kept an eye on other tools such as Google's Lively, OpenSim and Blue Mars. A year on we feel we have learnt a lot in a short period of time and see genuine value in using virtual worlds to support teaching and learning as well as research."

Sheila Webber[87] has spent much time developing her skill set in one virtual world, making her reluctant to repeat this process:

"I'm afraid I haven't done much shopping around, to be honest. I have dipped into a couple, and watched videos and read about others. There is, I am aware, a certain amount of inertia, in that I have developed skills, content, contacts and pieces of land, and I don't want to go on

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[84] Fiona Littleton, Associate Lecturer, School of Education, University of Edinburgh.

[85] Dr Liz Falconer, E-Learning Development Unit Manager, University of the West of England.

[86] Andy Beggan, Manager, IS learning team, University of Nottingham.

[87] Sheila Webber, Senior Lecturer, Department of Information Studies, University of Sheffield.

another learning curve without feeling that there are obvious benefits. I have been able to develop my pedagogy in Second Life, over two years now: some of this experience would be transferable to other virtual worlds, but not all."

At Imperial College, Second Life is used by one team[88] while consideration of other virtual worlds remains a possibility:

"Yes we have [considered virtual worlds other than Second Life] and we continue to consider them. We may well use alternatives to Second Life in a future project and where feasible we have developed technologies that are independent of the virtual world in which they are visualised.

To date, Second Life has fulfilled all of our needs for educational and patient safety projects and the public nature of the Second Life Grid has facilitated our public engagement projects.

We would consider OpenSim, Sun's Wonderland or Forterra's Olive for projects requiring behind-the-firewall access, or where we needed to work across the age ranges of the two Second Life Grids (i.e. 13-18 and 18+)."

Pauline Randall[89], a virtual world developer for the education and commercial sectors, still favours Second Life with some reservations:

"I'm still favouring Second Life because in many ways it is the easiest option. Hosting taken care of, just need to decide how much space and get on with it. Also access to plenty of content – I don't believe in creating everything any more than you'd suggest that your Real Life builder made all the chairs etc. to go into the Real Life building he was constructing! In addition, there is a good sized education community which I think most users like to engage with.

On the other hand I have to say that I'm looking increasingly at buying some space on ReactionGrid. It would allow me to use OpenSim with the hosting taken care of but get me away from some of the issues of Second Life that can be restrictive (age, adult content – admittedly more contained now but the reputation is still there)."

David Burden[90] is using Second Life while watching progress with OpenSim, and sees a future with the two services working in tandem:

"In our view Second Life still provides the best combination of flexibility, immediacy, and looks.

OpenSim still takes too much effort to manage in our view for most users, but is getting there. There is a danger though that new Second Life features might outstrip OpenSim features; key issue will be how competitive Nebraska pricing is. The ability to customise OpenSim to what you want is nice though, and we still see the future as some sort of Second Life / OpenSim / hypergrid hybrid."

3.7 The 'single vendor' issue

Second Life is a commercial product, owned by Linden Labs. This business aspect is raised by some respondents, such as Andy Beggan[91], as potentially negative.

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88 Dave Taylor, Programme Lead, Virtual Worlds and Medical Media, Imperial College London.

89 Pauline Randall, virtual world developer, http://www.virtual-e.co.uk/

90 David Burden, Manager, Daden Limited.

91 Andy Beggan, Manager, IS learning team, University of Nottingham.

"We don't see our developments in Second Life as a mass market promotional vehicle, rather it is a virtual flexible space not limited but the rules of physics or economics. A closer analogy for us is the Star Trek 'holodeck' rather than a virtual world.

However, a big limitation for us with Second Life is the single vendor dependency. As such, we are in some early discussions with other Higher Education Institutions about this issue and potential mechanisms for reducing risks associated with Second Life."

Aspects of the commercial nature of Second Life were mentioned by Ferdinand Francino[92]:

"OpenSim is not (yet) replacing all the virtual world activities taking place on Second Life but we put a lot of effort into it. The main reason is that Linden Lab is a virtual world service provider; compare it with an ISP offering IIS (Internet Information Servers). It offers hosting, shabby support (but I saw pre-built regions on their website recently) and that's about it. OpenSim allows you to have your own virtual world(s) running on your own servers; compare this with an Apache Webserver.

OpenSim gives you the ultimate control over content, access, updating. It gives you ownership instead of use or rent. You don't have to deal with Linden Lab or their business plan. You can have more prims, and the size you want them to be. You don't have to pay for more regions. Your expenses generate knowledge in your institution; it's more of an investment than it is a cost.

It can run within the university firewall; no access from the outside. I don't have to perforate my firewall with a million of holes that might or might not be used by Linden Lab or some unidentified cracker. We deal with confidential data in the university. Student records. Financial data. We don't like our firewall being compromised and worse, companies we deal with like it even less (and might tell us to stop it). And if we want to give access to (a part of) the virtual world we know exactly which handful of ports we need to open."

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[92] Ferdinand Francino, Project Manager, CU There, GCU Web 3D & Virtual Worlds, Glasgow Caledonian University.

4. Other Worlds

There are, of course, virtual worlds other than Second Life and OpenSim which are being used in education, or have the potential to be used. In particular, Metaplace and Forterra's OLIVE have been generating interest and experimentation in several UK universities.

4.1 Active Worlds

Daniel Livingstone[93] from the University of the West of Scotland had a negative experience with Active Worlds[94]:

"Active worlds is very aged – poor 3D experience."

Lancaster University also examined Active Worlds, but decided to use Second Life instead, as Michele Ryan[95] explained:

"We looked at Active Worlds a bit. We played around in it, but in the end did not bring the students in it. Mostly we wanted to consider a less commercially based world. We had concerns about control issues and felt uncomfortable using a platform [such as Second Life] that was 'owned' by some else (i.e.: Linden Lab).

We did not stay with Active Worlds for several reasons. Cost was an issue but mostly because there are more 'people' in SL and thus the experience is richer. Also we try to use artifacts that other have developed. Visiting other people islands instead of having to create everything from scratch. SL provided a larger range of third party-created and free places to visit and use for our courses.

We felt the limitation of Active Worlds being a collection of separate worlds was greater than the benefit of the added security a private world offers."

Maria E Toro-Troconis[96] looked at Active Worlds but decided to stay with Second Life:

"We did consider Active Worlds before deciding to go with Second Life back in 2006. However, we found the authoring tools in Second Life much more user friendly. We also started to realise the potential for a bigger Second Life community of UK educators growing in the UK.

We wanted to develop game-based learning in virtual worlds. We found Second Life was more flexible and adaptable. The support we received from Second Life was very efficient so we were always able to find answers to our questions."

David Burden[97] is a previous user of Active Worlds who is not optimistic about its future:

"We were using Active Worlds before Second Life and at the time it was great. The integrated browser and easy text on a prim make it well suited for a lot of educational uses - but hopefully we'll have both in Second Life in 6 months. The visuals now look very poor though; but again lower bandwidth spec may work for some users. Local hosting of assets is a nice

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[93] Dr Daniel Livingstone, Computer Science, University of the West of Scotland.

[94] Active Worlds: http://www.activeworlds.com/overview.asp

[95] Michele Ryan, Research Student, Management School, Lancaster University.

[96] Maria Toro-Troconis, Senior Learning Technologist, Faculty of Medicine, Imperial College London.

[97] David Burden, Manager, Daden Limited.

option, and server hosting is simpler than OpenSim. This could be a stepping stone from Metaplace to Second Life, but guess that it'll just be squeezed out."

4.2 Active Worlds Europe

Mark Childs[98] explains the difference between Active Worlds Europe[99] and Active Worlds, and his consideration of this particular virtual environment:

"It's basically though the same program, but a different company (and different grid), targeting the European market.

The CEO of AWE – Emmanuel Grijs – bought the franchise for developing a version for Europe from the original Active Worlds company. There have been some upgrades to the viewer since then. I'm not sure if these originate with Emmanuel, or are roll-outs of developments the original Active Worlds company is making, so the software might be slightly different now.

Since Emmanuel is Dutch the world is mainly bilingual, Dutch and English. It's got quite a large number of customers in parts of Europe. If people tend to prefer it over Second Life it's because of no adult content, lower resource demands, and it also enables (and Emmanuel encourages) people to use their Real Life names rather than pseudonyms – so supports augmentationists rather than immersionists.

The original reason for going for them [AWE] was as part of a communication strategy for DIVERSE, a network of practitioners using visual technologies for education. The year we started planning to use an immersive virtual world for communication, the annual conference was in the Netherlands, and AWE is an Netherlands-based company. The CEO of AWE was presenting at the conference. In addition, some of the committee were concerned about the reputation of Second Life (one said that it was associated with child pornography and gambling). The lower resource demands of the viewer of AWE also made it more useful.

In the end we stuck with Second Life. I think the better graphics made it feel more immersive, and the resource issues (and reputation) didn't happen to be a problem with those who were already engaged with immersive virtual worlds."

4.3 Blue Mars

Kate Boardman[100] at Teesside experimented with this new entry in the virtual world sector:

"I've flirted with a couple of others, and not seen anything that suggests the same potential [as Second Life] really. I've also had a look at Blue Mars[101], as our digital innovation institution are looking at it, but again, I don't see it as a tool to put on an academic's desktop."

Peter Twining[102] is also following the progress of this particular virtual world:

"I'm looking at Blue Mars Online at the moment. It looks like it uses a more powerful underlying technology than SL – and developers can have more control over who can access their areas etc. Still very early days … watch this space."

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[98] Mark Childs, Teaching Development Fellow, Faculty of Engineering and Computing, Coventry University.

[99] Active Worlds Europe: http://www.aw-europe.com

[100] Kate Boardman, Head of E-Learning, Centre for Learning & Quality Enhancement, Teesside University.

[101] Blue Mars Online: http://www.bluemarsonline.com/

[102] Dr Peter Twining, Senior Lecturer, Department of Education, Open University.

Annabeth Robinson[103] can see potential in Blue Mars but needs more details on the costing before committing:

"This is currently in Beta; it looks potentially powerful and very compatible with our new course. As the technology is based on the game-engine of CryEngine2, there is a lot of transferable skills in creating Game Art assets, i.e. 3D content and textures / shaders, that mirror the game industry. Being able to take students into an effective online space gives them an opportunity to test them with an audience, and have an appropriate Game Asset portfolio.

It has not been introduced to the college yet, as it is still in early beta and is PC based, and we run predominantly on Macs. Also, the costing modelling isn't publicly available yet, so I'm unwilling to get wrapped up in something that college finances wouldn't be happy to cover."

Other respondents replied informally that Blue Mars looked interesting, but that the significant resource required for download and operation was off-putting.

4.4 Croquet and OpenCroquet

Croquet[104] was mentioned by several respondents, though comments on this particular world were insubstantial. Peter Miller[105] had previously examined Croquet and noted that:

"In the early days Open Croquet was too unstable on the desktop hardware I had available."

The virtual worlds research team[106] at the University of Ulster discounted the open source version of this particular virtual world:

"We started to look at OpenCroquet and investigate its features/advanced functionality in terms of communication, collaboration, resource sharing, and synchronous computation among multiple users. However it works off a peer to peer protocol and we would have to work closely with our IT department if we wanted to explore/deploy this further. It is very promising."

4.5 Google Lively

Google Lively[107] was a virtual world that was closed down at the end of 2008. Several respondents to previous snapshot surveys briefly looked at it, with Sheila Webber[108] being one of a very small number who attempted to use it more formally:

"Google Lively – it was more accessible [than Second Life] – but it had limited functionality, and then it died. I got as far as having meeting up with a research student studying at a distance, who couldn't access Second Life for technical reasons. We had a hilarious half hour (discovering we'd chosen the same avatar, trying to move around and talk, then finding someone else in our room) but decided it wasn't adding much."

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[103] Annabeth Robinson, Year Tutor, Digital Film Game and Animation, Leeds College of Art.

[104] Croquet Consortium: http://www.opencroquet.org

[105] Dr Peter Miller, School of Biological Sciences, University of Liverpool.

[106] Michael Callaghan and Kerri McCusker, Serious Games and Virtual Worlds research team University of Ulster, Magee.

[107] Wikipedia entry for Google Lively: http://en.wikipedia.org/wiki/Google_Lively

[108] Sheila Webber, Senior Lecturer, Department of Information Studies, University of Sheffield.

4.6 Metaplace

Daniel Livingstone[109] was one of several respondents who have experimented with Metaplace[110], a virtual world with an isometric display:

"I have had a few classes in Metaplace, and done some proof of concept work with SLOODLE in Metaplace. It's light, simple fun and give a chance to do lightweight stuff with minimal learning curve for participants. But there's no integrated voice (need Skype or Ventrillo)."

The virtual worlds research team at the University of Ulster[111] also examined Metaplace, but decided not to use it in their work:

"Metaplace allows fully functional virtual worlds to be added into any website or forum and allows the users to add RSS feeds, links and even portals to other worlds.

These are all powerful and useful features. However the overall look/feel, 2.5D interface and graphics of Metaplace are not as rich or immersive when compared to many other virtual worlds. For these reasons we decided not to use it."

Neil Hamilton[112] found the security and download ease of Metaplace attractive:

"Metaplace was of interest as it is browser based with minimal download requirements and doesn't need specific ports opened. We are still evaluating Metaplace both for use with our medical students as a platform for public health information for the public.

We set up an initial proof of concept Metaplace 'Hospital'[113] and we will be asking students and staff their opinions on whether or not this is a learning environment worth developing further. I am hoping to do this in the first quarter of 2010."

And J Ross Nicoll[114] found Metaplace to have some potential:

"Metaplace appealed because it is extremely easy to access (Flash based client that will run in most web browsers), although we've never had a project we felt Metaplace would suit well. This may change later."

David Burden[115] finds some aspects of Metaplace to have educational potential:

"Metaplace could be very good for primary / early secondary school use. The LUA language is a bit odd but it gives good scripting opportunities and access to web services. Low graphics and bandwidth make it suitable for low specification access. We ported our bot technology there and it is working on PIVOTE."

N.B. There is an interesting comparison[116] of Second Life and Metaplace, produced by the virtual worlds researcher Sarah Robbins.

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109 Dr Daniel Livingstone, Computer Science, University of the West of Scotland.

110 Metaplace: http://www.metaplace.com

111 Michael Callaghan and Kerri McCusker, Serious Games and Virtual Worlds research team University of Ulster, Magee.

112 Dr Neil M Hamilton, Director of the Medi-CAL Unit, University of Aberdeen.

113 The Metaplace Hospital: http://www.betterverse.org/2009/08/metaplace-hospital.html

114 J Ross Nicoll, Research Fellow, School of Computer Science, University of St Andrews.

115 David Burden, Manager, Daden Limited.

116 Second Life vs Metaplace: http://ubernoggin.com/archives/430

4.7 Neverwinter Nights

Judy Robertson[117] is a former user of the Neverwinter Nights[118] editor:

"I also have previously taught with the Neverwinter Nights game editor. Neverwinter Nights is cool, but I was looking forward to trying a multi user environment for user generated content."

4.8 OLIVE

Ron Edwards[119] outlined why Coventry University are using OLIVE. (Ron is the CEO of Ambient Performance, the 'European distributors and service providers for Forterra Systems'[120] OLIVE virtual world platform'.)

"We are working with Coventry University who are using the Forterra Systems OLIVE platform to design and conduct emergency response strategic training.

They are using OLIVE because it is private, secure, and provides a better user experience with regards to communications as the avatars are more natural than alternatives and the exercises involve a lot of interactions with participants. The ability to record the sessions for instant feedback, exercise design input and auditing is another requirement met by OLIVE.

Data interoperability is critical so GIS data and 3d models from a variety of sources are imported for more realistic scenarios. These could be exported to other platforms if required in the future. The platform will support extending and scaling the training service from senior decision makers to the emergency responders themselves."

4.9 Playstation Home

J Ross Nicoll[121] found some aspects of this games console-oriented virtual world appealing, but not enough to pursue further:

"Playstation Home appealed because it had simple hardware and maintenance requirements (fixed hardware platform, automatic updates), and was more aesthetically pleasing than Second Life. However, initial attempts to contact Sony to discuss the possibilities for creating educational content in Playstation Home failed, and overall it was felt the upsides were not significant enough to continue pursuing the idea."

Annabeth Robinson[122] pursued the use of this particular platform further within her institution, and sees potential when students are able to integrate their own content:

"Our Digital Media studio has both Xbox360 and PS3 machines, for students to play on and research game art and design. The PS3 also can run levels created on our PC copies of UnrealEd3.

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[117] Judy Robertson, Department of Computer Science, Heriot-Watt University.

[118] Neverwinter Nights community site: http://nwn.bioware.com/

[119] Ron Edwards, CEO, Ambient Performance.

[120] Forterra Systems Inc: http://www.forterrainc.com/index.php/industries/education

[121] J Ross Nicoll, Research Fellow, School of Computer Science, University of St Andrews.

[122] Annabeth Robinson, Year Tutor, Digital Film Game and Animation, Leeds College of Art.

We wanted to explore Home, mainly as it was a 'space' that was experimenting with virtual worlds for advertising / branding. Also the graphical quality was appealing to students. Sadly we could never get the PS3 on the college's network properly, so it could access Home; the IT department thought game consoles on the network were a security risk, so we could only access the college's wifi.

Students with their own PS3's accessed Home in their own time, and after the initial 'wow' factor of the graphics, found the place quite dull after twenty minutes - particularly due to the lack of a User Generated Content opportunity.

Anecdotally, a few students reassessed Second Life after this visit to Home, and despite the lack of fidelity of image, could see the breadth that Second Life could offer them.

I'd still like to get the college's presence working properly on Home. As a tutor, I find there is a lot of content in Home that can be explored critically. Also, when Sony allow European users the ability to set video and images in their own apartments and clubs, then there is potentially an interesting gallery / portfolio space and marketing for the course."

4.10 Twinity

Anne Cunningham [123] finds the realism of Twinity[124] of interest:

"For my purposes the concept of Twinity is appealing – because I want to simulate the real world rather than a weird and wonderful (slightly offputting) one."

4.11 Wonderland

Daniel Livingstone[125] is awaiting progress with this particular virtual world:

"Wonderland[126] is still in active development – will be nice when it's finished."

Ian Truelove[127] found the current performance of Wonderland unacceptable:

"I have also experimented quite a lot with Wonderland, but I found it difficult to shape it into what I needed it to be, and I found the performance was shockingly bad, even on a reasonably new and powerful computer. This ruled it out as an option, as most of my students' computers are less powerful than mine."

However, the virtual worlds research team [128] at the University of Ulster thinks Wonderland has future potential:

"We found Wonderland to be very experimental technology in its early stages of development and we have chosen not to use in teaching and learning yet. It looks promising and is something we will return to."

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[123] Dr Anne Cunningham, Senior Lecturer, School of Sciences, University of Sunderland.

[124] Twinity: http://www.twinity.com/en

[125] Dr Daniel Livingstone, Computer Science, University of the West of Scotland.

[126] Project Wonderland Toolkit: http://lg3d-wonderland.dev.java.net/

[127] Ian Truelove, Senior Lecturer & E-learning coordinator, The Leeds School of Contemporary Art & Graphic Design, Leeds Metropolitan University.

[128] Michael Callaghan and Kerri McCusker, Serious Games and Virtual Worlds research team University of Ulster, Magee.

David Burden[129] hasn't yet used Wonderland but is tracking developments with this virtual world:

"We have not yet engaged with Wonderland; it still appears to be very much a Sun push, although it's nice to see their student project lists includes integration with, or duplication of, Daden projects."

4.12 World Beside

Kathryn Trinder[130] has had a look at a virtual world developed for the Norwegian education sector:

"As for other worlds that are much more similar to SL, I'm aware of a development in Norway, with Oslo University and an associated company called World Beside[131], who have been developing a 3D platform specifically for education over the last few years. Their focus is more on school age children and young teenagers.

They claim that the physics in World Beside is considerably better than Second Life, and they are using it for science teaching. From the demo I've seen it's pretty neat and if 'content' fitted better with Higher Education then I'd be keen to try it out here (it is a little too much 'content' driven at this stage, a 3D learning object repository, though this will change). They've run pilots over the last 2 years and are now looking at rolling it out further."

4.13 World of Warcraft

Kathryn Trinder[132] has some thoughts on World of Warcraft:

"Other Virtual Worlds that seems to get quoted often appear to be game worlds, such as World of Warcraft, and although I like the way that quests in these games seem to map to learning activities, and I am very keen on the community and sharing side of things in these worlds (much more developed than Second Life) I don't think those worlds in themselves are of much use for education.

The processes they use and the social aspects yes, but not the technology. On saying that I believe some under-16 schools are exploiting World of Warcraft for maths teaching."

The costs involved with World of Warcraft were off-putting for J Ross Nicoll[133]:

"World of Warcaft was considered as a platform students would be likely to have experience with, or at least have heard of. However, per-user monthly licensing costs and lack of a clear usage case meant the idea was dropped early on."

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[129] David Burden, Manager, Daden Limited.

[130] Kathryn Trinder, Glasgow Caledonian University.

[131] World Beside (in Norwegian): http://www2.worldbeside.com/

[132] Kathryn Trinder, Glasgow Caledonian University.

[133] J Ross Nicoll, Research Fellow, School of Computer Science, University of St Andrews.