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Virtual Reality and the University

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Abstract

It is difficult to talk meaningfully about virtual reality (VR), since there have been several types of computing technology that are given this label, and a number of differing aims ascribed to their use. The origins can be projected backwards almost indefinitely into myths and legends of other worlds, or related to twentieth century science fiction (which though seemingly prescient, in hindsight, has influenced our development, use and interpretation of present day technologies). Many still impute to such technologies quasi-mystical powers which remove us, in some ambiguous fashion, from the here-and-now, and places us somewhere else, namely the virtual. In this paper, I discuss what the adoption in UK universities over the last 15 years of educational technology, namely Virtual Learning Environments and Virtual Worlds, tells us about responses to computers, the idea of the virtual, and to what extent we can use novel educational technologies effectively in higher education.

Keywords: Virtual Reality, Educational Technology, Higher Education, History of computing

1.0 Introduction

> Virtual learning poses challenges for all universities - indeed all learning providers. But the challenge is also a national one - how can we best, as a country, respond to the wave of change that e-learning is bringing to higher education throughout the globe? (Blunkett, 2000)

It is difficult to talk meaningfully about virtual reality. For a start, there are several types of technology that are given this label, and a number of differing aims ascribed to their use. The roots of VR can be projected backwards almost indefinitely into myths and legends of other worlds, or related to the emergence of twentieth century science fiction, which though seemingly prescient, in hindsight, has coloured and influenced our development, use and interpretation of present day technologies.

Though the term is most closely associated with computers and the Internet, which, as we all know, are frustrating in their day-to-day normality and unreliability, many still impute to this technology quasi-mystical powers which remove us, in some ambiguous fashion, from the here-and-now, and places us somewhere else, namely the virtual. In the past 15 years UK universities have investigated several types of computer-based educational technologies labelled with the word 'virtual', with varying degrees of success and 'virtualness'. In general it is difficult to evaluate a specific adoption of a particular form of educational technology, so if the label 'virtual' is also applied, or claims are made about such technologies concerning virtual reality, which, as the paper demonstrates, comes with its own history of sense-making, it becomes even harder to assess the real potential of a new technology in education. In this paper I discuss what the story of adoption in universities of certain educational technologies, such as Virtual Learning Environments and Virtual Worlds, tells us about human responses to computers and technology.

This work is not based on empirical research; rather it is an exploratory study to identify current practise and potential for VR in education. The method deployed in this work is that of socio-historical analysis, in which a number of educational technologies are discussed with respect to the contemporaneous interpretation of virtual reality, with the aim of deciding which current forms of educational technology labelled virtual, are, in fact, useful, and which are unlikely to be adopted by any serious educationalist. To this end, I discuss the following types of software: (i) Virtual Learning Environments (VLE); (ii) Virtual Universities; and, the most recent, (iii) Virtual Worlds; linking each, wherever possible, to associated policy on development and adoption within the pedagogic process (see Michaelson, 2006a, for a fuller discussion of this analytic method). To what extent any of these forms has, or can attain, any of the proposed goals of virtual reality (VR), or can even be regarded as being in some way virtual, is explored in this paper.

First, I present a brief overview of the aims and origins of VR as technologies interpreted as virtual emerged from computing labs and research centres, with a timeline of technological development, and a discussion of the particular forms that VR technologies take. Then I show how Universities have adopted (or failed to adopt) computing technologies described as virtual, namely VLE and the Virtual University.

The next section discusses the current academic interest in virtual worlds, using a number of examples of work which explore virtual reality and education to illustrate some of the key arguments. This is followed by a critique of Second Life, a popular virtual world with user-controlled content, noting the technical and social limitations of its use within educational contexts. In conclusion, I discuss how the examples discussed here tell us more about responses to technology, and effect of novel interventions in education based on such responses, than they do about virtual reality.

2.0 Virtual Reality History

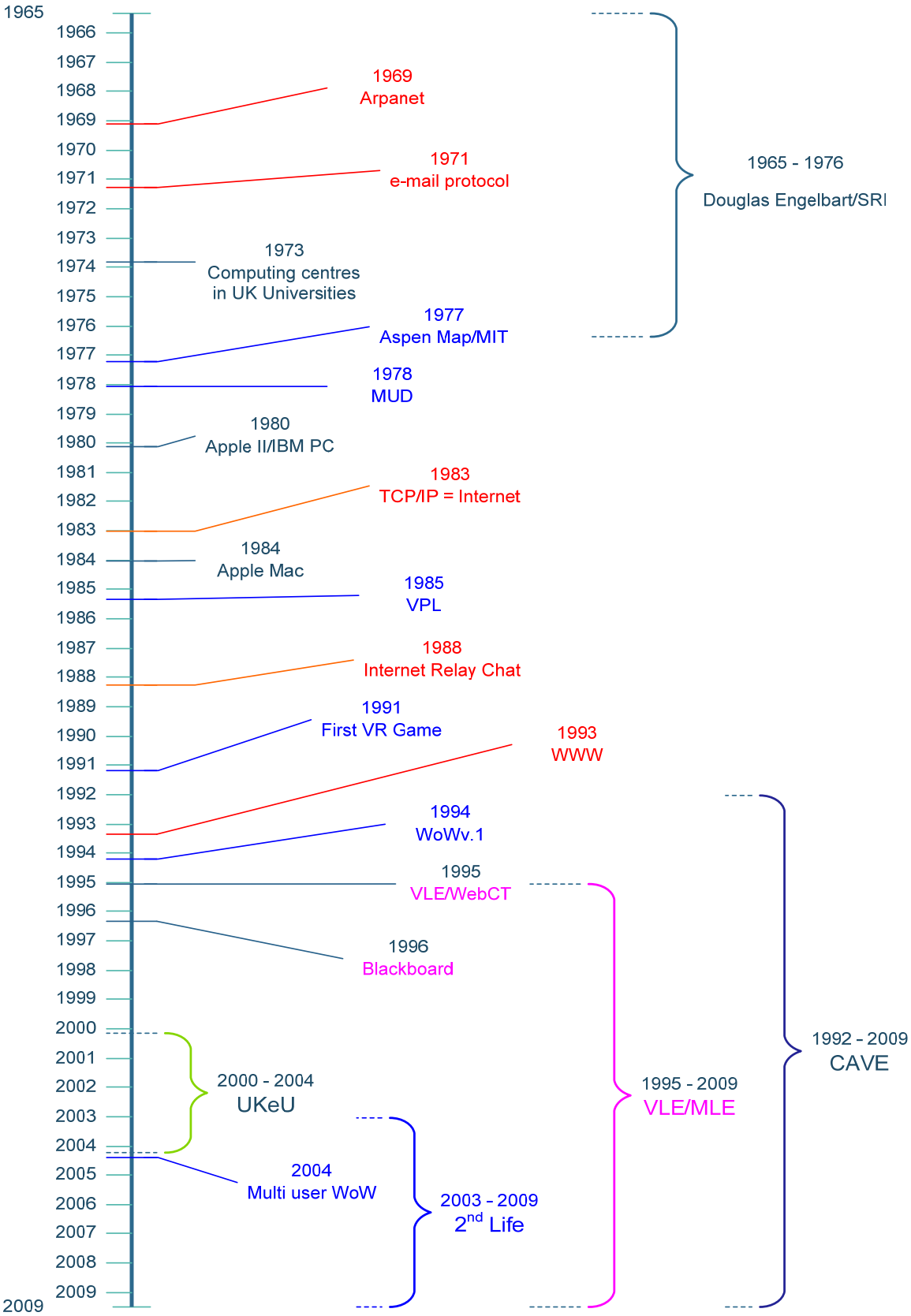
In this paper Howard Rheingold's 1991 book "Virtual Reality" is used as a basis for a discussion of the technological history of VR, and how the social description has changed in focus over time (Rheingold, 1991). In this text a wide range of computing technologies and associated research and development are presented as being virtual – these include the mouse, headsets and gloves, robotics, news groups and computer-aided design, amongst several others. A number of interviews with outstanding researchers in industry and academia across the world provides a comprehensive over view of the state of computing in the late 1980s, and how this technology was perceived by those who had not been involved in the creation of the hardware and software at that time. In his enthusiastic introduction, Rheingold presents us with a number of aims for virtual reality, stating "one way to see VR is as a magical window onto other worlds, from molecules to minds. Another way to see VR is to recognize that in the closing decades of the twentieth century, reality is disappearing behind a screen" (Rhiengold, 1991, p. 19).

A list of less fanciful aims for VR can be deduced from his interviews and writings as follows:

- First, using computing technologies to create a fully immersive and integrated experience;
- Second, to simulate reality so well that the simulation of reality cannot be regarded as a simulation;
- and third, to investigate our understanding of reality by trying to simulate it.

The timeline of computing technologies and VR presented below demonstrates that this first aim has had some influence on the design and developments of human-computer interfaces. It also allows us to put notions of the virtual as responses to computing technologies into a historic context. A more complete overview of the history of VR technologies, with startling period illustrations, is provided by Lok and Babu (2008), or the National Center for Supercomputing Applications (NCSA) web-site of 1995 hosted by the University of Illinois (NCSA, 2009). The other two aims detailed above are more difficult to establish as having been met by present day concerns with the virtual, but they have influenced attitudes towards more recent VR developments, and their adoption in the university sector. Specific types of VR based on the development of these technologies can be identified, and are classified as (i) Immersive VR; (ii) 2D/3D graphical representations; (iii) Computer-Mediated Communication (CMC); and (iv) Virtual Worlds. These are discussed in more detail below.

Timeline: Technologies & VR



2.1 Immersive VR

From the 1980s onwards immersive VR involved the use of headsets and gloves, and screen projections of photos or computer-generated images (see 2.2 below). One of the earliest examples of this type of VR was the MIT Aspen Maps project of 1977, and the most recent the Cave Automatic Virtual Environment (CAVE) currently found in many university research centres. This is an expensive technology, usually deployed in specially constructed computing labs, and is immersive only to the extent that sight and sound, and some movement, are or may be involved (several authors have commented on the lack of other sensory inputs, such as smell, in immersive VR including O'Shea and Rheingold). Research into touch-sensitive computer controls is on-going, and the results in commercial deployment are as yet not very subtle (see the Wii). The popular computer game, Guitar Hero, which may be regarded as being of this type of VR, uses a number of large buttons to mimic finger positions on the guitar neck, and a strum response which is supposed to keep time with the scrolling musical notes on the screen. This is such a long way from simulating the actual playing of a guitar, that it may remove musical ability from the learner, and has resulted mainly in commercial gain for the music industry by increased band/brand recognition. Other guitar simulations, such as the virtual slide guitar, and its precursor, the virtual air guitar, are more complete forms of VR as noted in the second aim listed above, but these still fail to convince as new musical technologies, and are of research interest in universities, as opposed to teaching tools (Pakarinen, 2008).

This form of VR is often used where physical training for specialised activities which are either impossible to do for real (landing a manned space craft on the moon) or too expensive to use in training, such as flight simulators for novice pilots. Due to the limitations of haptic interfaces, immersive VR is unlikely to be of use for teaching, say, cookery, or many of the lab-based sciences such as chemistry, biology and physics, with their emphasis on conducting actual experiments with real equipment where ever possible.

2.2 2D/3D Graphical Representation

Two and three dimensional graphical representations allow the user to 'walk through' static images, or rotate and observe objects as in the following applications: Google street maps; Google's SketchUp; reconstructions of historic sites, found in

archaeological displays, museums and tourist centres; and in television programs which re-invent the past or project the future, or invite us to consider great feats of architectural design. The software used to create such forms of VR, and for manufacturing design in general, have become widely used in higher education, because they are the day-to-day tools of the engineer and planner. Since their advent in the 1980s, computer-aided design (CAD) and computer-aided design and manufacture (CADCAM) packages have become the tools of many professions (see, for example, Rheingold, pp. 179-180, for a discussion about AutoDesk.) It is now standard practise in universities to teach students how to use CAD software and other, more specialised 3D drawing packages such as Rhino, for specific professions such as architecture, engineering and computer games design. The software is commonly available as a professional tool, and hence has entered education, having been absorbed into the mainstream prior to Rheingold's writing. It is important to note that this form of VR, in this particular context, is no longer talked about as being virtual.

2.3 Computer-Mediated Communication (CMC)

Rhiengold includes several communication technologies in his 1991 overview such as e-mail and IRC (Internet Relay Chat). Amongst more recent CMC applications which have at various times invoked the virtual or been designated as VR are video conferencing and Skype (phone calls over IP). In education there are several uses for shared applications which make use of CMC, such as whiteboards, many of which emerged from research into Computer-Supported Cooperative Work (CSCW). Most recently, Wikis, Blogs and Twitter, all forms of social networking, have been described in the popular press, and by researchers, as virtual, and have become the subject of sociological invocations of virtuality, with all the attendant dystopic and utopic visions of technological determinism, as found in writings about the advent of the Internet and the imminent networked society.

2.4 Virtual Worlds

Virtual worlds provide 3D versions of constrained worlds, with 3D characters known as avatars, which are controlled by individual users. The timeline above demonstrates that this form of VR emerges from the addition of computer games, and 2D and 3D modelling, as in section 2.2 above, to the use of the Internet. One of the early influences on the development of virtual world software was Multiple-User

Dungeons, the first multi-user networked game, which was developed between 1978 and 1982 by students at the University of Essex (Bartle, 2003). It is now commonplace for computer games to deploy virtual worlds, especially systems like X-box, where a user controls a 3D character or avatar, and can move between a first-person (seeing the world through the eyes of the avatar) and a third-person (seeing a general view of the world which includes the user's avatar) point of view, whilst talking with other members of the group game. The extent to which these forms of VR can engage the student and change modes of education in the university is discussed in section 4.0 below.

3.0 Universities and VR

3.1 Virtual Learning Environments

A Learning Environment (LE) is the term used to describe educational software which makes use of a set of Internet applications with a common, web-based, user interface. In the UK the term Virtual Learning Environment (VLE) has been used since 1996; and, from 1999 onwards, the phrase Managed Learning Environment (MLE), when a VLE is integrated with other university IS, such as the student record system. These terms are not common elsewhere in the world, where they are more often known as enterprise systems. VLE were defined in an influential JISC report as follows:

> ….. learning management software systems that synthesise the functionality of computer-mediated communications software (e-mail, bulletin boards, newsgroups etc) and on-line methods of delivering course materials (e.g. the WWW). (Britain, 1999)

Other functions the authors of this report associate with VLE include a notice-board, course outline, asynchronous conferencing tools, class list and student homepages, metadata, assignment setting, assessment, synchronous collaboration tools, file upload area, calendar, search tools and bookmarking. These are the common functions found in commercial software, such as those provided by Blackboard and WebCT, and open source software such as Boddington or Moodle (Blackboard, 2009; Bodington, 2009; Moodle, 2009). It is important to note that the educator is expected to produce the *content* or educational 'stuff' to be placed in/on a VLE. Not much emphasis is placed

upon what content contains, as if the creation of content were both natural and easy, but materials must be provided as files.

Since the first enthusiasms for VLE in the late 1990s and early 2000s, associated with a number of initiatives funded by government via the Joint Information Systems Committee (JISC), the limitations of these systems are now understood (see Michaelson, 2002, for an overview of the emergence of VLE, and the history of the associated funding initiatives). Firstly, they are used mainly as places to store and distribute files, with administrative elements for students and modules provided by integration with the university student record system. This allows more central control of the academic process, since use of the system by staff and students can be monitored, and is mainly driven by the student record system. Secondly, these systems come with hidden costs, which include staff time spent on creating and maintaining their subject materials, and the costs to students of accessing the VLE from outside the university, and printing out the materials (since the number of handouts provided by the school or department are reduced once VLE are in place). Thirdly, they are associated with the rise of the learning technologist, a new member of staff who acts as another part of the technical support system required for smooth running of the VLE. Fourthly, as with previous educational technologies, they are an additional method of teaching and learning, since lectures and tutorials are still in place (as in the term ‘blended learning’ to signify that the electronic method of teaching is just one among many). Fifthly, if chat rooms are used, then to make them educationally effective, as much work is required from the lecturer as in face-to-face tutorials, if not more (Salmon, 2000; Michaelson, 2002; Michaelson, 2006a).

Though many universities have VLE (and are moving towards MLE) the uptake of this type of software has not been as extensive as expected in the late 1990s (UCISA, 2008). Nor have VLE radically transformed the academy, as predicted or hoped by many in the early phases of VLE adoption. They are most effective as a replacement for older delivery methods in distance learning modules, or as a surrogate for file sharing.

3.2 Virtual Universities

In the late 1990s, there were concerns from many countries about the need to create virtual universities, due to the globalisation of the university-sector. Change in universities was presented as necessary by those in government, academia and senior management because of various external and local threats and challenges, which included the globalisation of education, the emergence of mega-universities, the corporate university, the rising cost of higher education, and the expansion of the UK university sector without equivalent increased state funding (Laurillard, 1995; Blunkett, 2000; Jones, 2002; Goodyear, 2003). These threats were either underpinned by the new technology of the Internet and the web (that is came about because of the impact of technology), or were to be met and solved by use of this new technology. In either case, the predicted outcome would be that the nature of university teaching would be dramatically and irreversibly changed (though this has not been born out in practise). One response to these threats was the impetus to create a virtual university, with a web-site and some kind of VLE, and present this as the model for all of higher education (Laurillard, 1995; Michaelson, 2006b). Unfortunately the blurring of distinction between distance and social learning (campus-based higher education), and a range of disparate reasons for creating such a virtual university in the UK (for example, addressing the wider access policies of the time, as well as global competition for overseas students – two very different sets of potential students with different educational requirements) meant that the goals of the UK's e-university were not well defined from the start.

On 15 February 2000 David Blunkett, the Education Minister, announced the launch of a virtual university for the UK, which was established with the goal of competing globally with other networked institutions in the USA. The UK e-university was to be a commercial sector public-private partnership, funded with public monies of £62M, through the Higher Education Funding Council (HEFCE), which had no direct experience of running this type of public-private organisation. By February 2004, the project now known as UKeU, was closed down by HEFCE, having spent in the region of £30M. The subsequent inquiry found several reasons for the failure of the UKeU to meet targets for expected student numbers, and to find commercial partners who would match the public funds. The complete story involved technological misunderstandings, lack of accountability, lack of project management, and internal

and external disagreements about how such a university ought to be created, not an uncommon story in the history of visionary IS projects (Michaelson, 2006b). The UKeU was really virtual, in that it never existed, like many global virtual universities of the late 1990s and early 2000s, which also closed within a few years of the announcement of their imminent arrival (Ryan, 2002). Scotland had its own e-university initiative at the time, known as 'Scottish Knowledge', a company which also failed to produce a meaningful virtual university (HEFCE, 2001).

4.0 Virtual Worlds and Universities

In this section I discuss how virtual worlds might affect teaching in the university. Consider the popular multiple-user game, World of Warcraft (WoW); the game objectives are somewhat different from those in education. Any learning that takes place within WoW concerns playing the game, with its prescribed set of levels, story-lines, and roles. The novice needs to understand the social rules associated with game playing, and how to design more impressive avatars within the accepted range of possibilities (dwarves, warlocks, etc.). There is not much scope for discussing the early modern in literature, working out the mathematics of quarks and charms, or even learning a foreign language, other than, say, J. R. R. Tolkien's Elvish.

Despite these constraints there are different types of virtual worlds where learning may be possible, including those which have been specifically written with education in mind, and have used many of the design ideas of games such as WoW. One such example is the suite of software products from Alelo Inc., which help military personnel learn the basics of communication in Iraqi or Arabic, including important cultural elements such as hand and arm gestures, and head movements (Johnson, 2005; 2009). Not only do Alelo design language training for "linguistic and cultural competence" for American forces, they are also contemplating a web-based course for Voice of America to provide listeners with "an opportunity to develop spoken English communication skills and develop a better understanding of American culture" (Johnson, 2009). Other examples from academia include those of virtual scientific experiments, and virtual laboratories, which have been the subject of research and development for many years in university education, leading to the building of multi-

user environments in which students can explore, for example, Wireless Sensor Networks (Christou, 2008; Allison, 2007b).

However, rather than design new software products and applications from scratch, the virtual world which many are investigating in universities is that of Second Life, which differs from computer games which deploy virtual worlds, as noted above, because first, there is no explicit objective or story-line as in most games, other than social interaction, and secondly, and most importantly, the users create the content, once they have learnt how to use the scripting language developed by Linden Lab, the company which owns Second Life. Most of the buildings, artefacts, and more unusual avatars, have been built by those who pay to use the software, and these items can be exchanged for virtual money or Linden dollars (funded by actual money) within Second Life. Universities tend to buy an 'island' (equivalent to leasing one computer from Linden) since this allows control of access, which may need to be restricted for some educational uses. In 2009, the Virtual University of Edinburgh (VUE), which has established one such island in Second Life, put 'Awareness, Recruitment & Promotional Activities' at the top of its uses of virtual worlds (Tate, 2009; VUE, 2009), and, according to reports on the use of Second Life in the university sector, marketing and recruitment are among the reasons for creating a virtual presence (Kirriemuir, 2008; 2009). The most recent report from Virtual World Watch, in a series funded by Eduserv over four years, found that:

> While cases of virtual world use in academia have steadily risen, evaluations and evidence of their effectiveness has been fragmented and low key. Though the same observation could be levelled at many other technologies – take a bow, Virtual Learning Environments – used in education. (Kirriemuir, 2009).

The report further notes that the majority of academics are resistant to using Second Life, if not hostile to its use, making it less likely to become a widespread educational tool, other than for the enthusiast.

Examples of subject-specific uses of virtual worlds are found in the work of a team of researchers in the school of computer science at St Andrews University who investigate new forms of educational technologies. Their recent projects have involved simulations and virtual worlds, continuing an interest in providing support

for group-based learning. Two of these projects are (i) computer networking simulations which are used in undergraduate computer science courses (Allison, 2007b); and (ii) LAVA, in which undergraduates in archaeology learn how to manage an archaeological dig using a 3D game, based on an actual site, and project management tools (Getchell, 2007a; 2007b). Both of these have also been integrated into Second Life, to explore the problems and possibilities of using a commercial virtual world. Computing students on a senior level Human Computer Interface course were set the task of implementing, in Second Life, a 3D version of Dijkstra's Shunting Algorithm with the aim of producing a teaching aid. Students responded by creating systems of lottery balls and tubes, or train sets and carriages to model the algorithm, the effects of which could be demonstrated by turning on the Second Life 'physics engine' for the linked set of objects, which then allowed balls, containing individual symbols, to drop through the tubes, or carriages with labels to move along railway lines, until a set of symbols in the correct order had been created.

As a result of this experiment, several drawbacks to the use of Second Life in the university were noted. For example, though interesting models were developed by the class, it was difficult to mark student work. Lecturers needed access to the student code as well as being able to run the examples in Second Life, in order to de-bug or assess the design process. Second Life is not designed for that level of sharing of the underlying code that a user deploys to make an object. This problem with access to underlying levels of software, or data or other kinds, is found in many other 'real world' software applications which educators want to use, as the applications are designed for commercial agendas, with particular access controls in place, and with no educational objective in mind. This leads to a more general set of problems with using commercial Virtual World software.

5.0 Further problems with using Second Life in education

Warburton notes eight different problem areas in using Second Life in education. These include the user interface, cost (staff time, payments to Linden Labs, the cost of making an interesting avatar, etc.), the need for educational 'scaffolding' (explanatory materials to set the educational task or scene in context), the lack of integration with externally produced materials (such as VLE) and the inability to move avatars

between different virtual world applications (Warburton, 2009). Here, I discuss two issues, those of ethics and trust, and further technological barriers.

5.1 Ethics and Trust

Ethical choices and trust are important in education, and there are some issues with these when considering the use of Second Life in university teaching. For example, the avatar one chooses, as an educator, produces questions about identity and trust. Since there are a limited range of basic avatar bodies and styles available, complaints have emerged concerning the representation of ethnicity and age, as the set of basic options for skin colour and texture, or shape of the eye are limited, and hide subtle forms of discrimination (Welles, 2007). The glossy nature of the avatar finish, and the size and weight options available, are of particular concern where lecturer identity is concerned. Even if we would in general like to project a self image as being younger and thinner (or more like a rabbit) than we are in reality, there is an element of false representation in this choice, and sometimes avatar designs challenge perceived views of professional behaviour. Inclusion is problematic (though Second Life does include animal avatars) as there is little or no support for those who are visually impaired (see the comment about the user interface clutter below), and with the introduction of voice channels for users whose avatars are in close proximity, many deaf users have complained about the lack of integrated voice and text functions.

Since the users freely decide how their avatar behaves in Second Life, a large amount of time and effort is spent on what Linden Labs call ‘adult content’, leading to the exclusion of those under the age of 18, and producing a certain amount of ridicule from sections of the computing professions, where the term ‘Sadville’ is often deployed in satirical commentary on the exploits of both the users and the company (Ozimek, 2009). This, of course, is not a problem from the point of view of consenting adults, but it is a big problem for educators. Other social behaviours, such as bullying, or exploitation, which have been brought into the virtual world are also worrying, since within the university social codes exist which limit their effects. Interesting vignettes from Second Life include virtual financial scams and virtual strikes (the Italian workers in an IBM factory have been on strike both in Italy, and in the buildings controlled by IBM in Second Life – but if a worker strikes in a virtual world does any one really notice that they are not working?). These are useful as case

studies in Information Systems courses, leading to wide-ranging discussions about the unintended consequences of the design of technology, but hardly promote social software as a visionary educational tool (Orlowski, 2008a; 2008b).

5.2 Technology

The user interfaces in second life are poor - the screen becomes cluttered with text and signifiers when a number of avatars meet. Learning how to move (you can fly as well as walk) and talk takes a long time (estimates vary from between 16 to over 30 hours, see Berge, 2008) which has implications for student (and staff) use, since it cannot be assumed that all students (or staff) will have used this type of technology before. Finding the transportation button may be helpful, but working out how to transport to a particular location is not easy. Second Life software has other technological limitations for education. For example, the maximum number of avatars that can gather in one place is in the order of 40, without users observing bandwidth restrictions and slowness of response. It is important to have a computer with a high specification video card to optimise the resolution of images and reduce lag. The ability to use Second Life within the campus may be restricted by central IT services, wary of external computing threats and the way multiple-user game playing can slow down local networks.

In addition, as with most computing technology, ongoing maintenance is required. Just as web pages go out of date very quickly, so places in Second Life can seem very empty if classes and meetings are not scheduled, buildings do not match the realities of the campus, and no one can find the site, mitigating the advertising potential of the involvement. As with all educational technology adoption, it requires the lecturer to be enthusiastic; the students to be adaptive; computing support to be available; and resources to set up and maintain. Costs are rarely discussed in the history of educational technology adoption, and there is little or no data about how much any one university is spending on their use of virtual worlds, or about the costs to the educator in terms of preparation and materials.

6.0 Advertising or Education?

Both virtual worlds and Web 2.0 or social networking applications, have one thing in common; to some in the institution they are an important marketing tool. The following message was circulated to university staff as part of an electronic newsletter in May 2009:

> The University of XYZ has boosted its online profile by signing up to Facebook. We'll be using our page to create a virtual University community, let people know what's going on in and around the campus, and enable them to network socially with each other. We'd like to encourage current staff and students to engage with our Facebook page, so search for us in the Facebook universe and become a fan. We're now on Twitter as 'xyzUniv'. If you've got any University-related news - from the trivial to the major - please send it to twitter@dundee.ac.uk and we will 'tweet' it for you. Find out what we're up to over the summer from wherever you are in the world! (Hermes, 2009)

What is a virtual university community in the context of a fairly small and compact campus, where one meets other colleagues at meetings and seminars and in coffee rooms and canteens, or just by walking around. Is it something that can be created by the external relations unit? Some of the staff and students in the university may use Facebook or Bebo, or other Web 2.0 applications such as Flickr, but not all do so, or want to do so. Social networking software is generally used for keeping in touch with family and friends, or those with a common hobby, not to replicate work relationships or the work environment online; staff in most universities already use remote logins (via web browsers), and e-mail, to work at a distance. The use of Twitter may add an element of the novel (as it is the most recent addition to the plethora of new stuff popularised through the media) but since it is used as a form of self-advertising (or corporate advertising, as here), it does not seem a very meaningful way of making relationships and communities, virtual or otherwise. The assumption is that potential students will be using this technology already, and that the use of the virtual reflects an exciting and innovative culture, rather than a misunderstanding of what is currently fashionable.

7.0 Conclusion

When University education and the virtual technologies described above are discussed, an implicit blurring between two different types of learning and teaching occurs, that of social learning and distance learning. Otto Peters supports this distinction between distance learning, and learning which takes place in a traditional university, noting that "…face to face teaching and learning in *real* spaces on a campus and distributed learning in *virtual* spaces are two entirely different things" (Peters, 2001, p. 168). Thus 'social learning' happens when a student physically attends a university (whatever the type of student, course, and university) in direct contrast to what is commonly called 'distance learning' (which implies solo study, with materials produced elsewhere, little face-to-face contact with an educator or other students studying the same course, and no immediate exposition of subject matter, with its dramatic and dynamic import). It is ironic that the distance learning model of the university, which most closely fits the use of networked applications as a delivery mechanism, should be so unlike the experience of learning in the 'bricks and mortar' university, and yet be perceived as requiring the social processes supported by VR, which seem so artificial when used on campus to promote social cohesion.

There are interesting educational uses to be made of virtual worlds, as shown in the examples above. These uses require more subtlety and thought than is displayed in the creation of campus islands. As a means to reproduce social support in distance education they seem to me to have great potential. But to what extent simulations can be realised in a meaningful way in commercial virtual worlds like Second Life is still open to question, since it is difficult, if not impossible, to import other software applications. Existing CAD software, and other subject specific tools such as Mathematica, already provide education with powerful ways to simulate and analyse the real. Subject-specific simulations in closed virtual worlds which allow multi-user involvement do bring educational benefits, as demonstrated by the Lava and WiFi projects discussed above. Given the technological drawbacks of Second Life, areas for future research include developing more educational resources using software such as Open Sim (2010), which would allow the designers to more fully meet the needs of educators, and, perhaps, allow for an evaluation that can go beyond the administrative

barriers often encountered with computer-based educational technology. Though it may be fun to attend a lecture or seminar in Second Life, or have a rabbit guide you round a simulacrum of the campus, it is too early to decide how extensively such software will be deployed in university teaching. If we look more closely at the history of VR so far, the current interest in use of virtual worlds or social networking in education is likely to be superseded by the next technology on the virtual reality event horizon before too long.

By 2000 it was noted that the term virtual was an empty slogan used to talk up the novel technology of the day in all aspects of society, including universities. For example, the director of ESRC-funded Virtual Society? Programme, which ran from 1997 – 2000, stated "While claims about the radical nature and likely effects of new electronic technologies are widespread, it is important to distinguish hype from reality" (Woolgar, 2002, p.104). Certainly the case of the Virtual University above was an expensive misconception about what it means to be virtually educated. VLE are, quite frankly, dull and hardly virtual, unless used to support distance learning. Perhaps we should not be surprised that the more recent manifestations of VR, such as social networking software and Second Life, are now equated with marketing, rather than learning, in many universities.

Virtual Reality comes with a large element of wish fulfilment, coloured by a range of ideas from computing research, computer games, and science fiction (see the work of Isaac Asimov, Stanislaw Lem, Philip K. Dick and William Gibson, amongst others). Bittarello emphasises the use of the imagination in the creation of pre-computer virtual worlds, equating them with myths and fantasies of the past, and notes the down-playing of the second aim of VR identified above within contemporary writings, that of the complete simulation of real experience (Bittarello, 2008). Wertheim discuss how we associate computers and cyberspace with religion and images of heaven, the ultimate virtual world for some (Wertheim, 1999). The use of the word *virtual* in virtual reality can be better regarded as an ongoing response to computer technology, than as a meaningful term in itself. It is interesting to note that we do not talk about how we use phones as being similarly virtual, though most synchronous computer-mediated-communication mimics the way we use them. Once a particular form of VR, such as CAD, becomes used by many, or is no longer novel,

it too is no longer regarded as being virtual. So the virtual, and VR, seems to be made possible only by computers, imagination and, most importantly, novelty. Much of Rheingold's enthusiasm for contemporary technologies of the late 1980s is found in current writings about the use of the most recent thing to be given the VR label. Many of the applications he described are now commonplace, and are not perceived as having brought about the exciting new world 'behind the screen', since the potential of technology is to do with future experiences not those of the past, and those technologies we have adopted, assimilated and, sometimes, discarded, are not part of the virtual promise.

Though this paper is an exploratory study, it demonstrates that the use of socio-historical analysis with regard to technology, policy and practise can help us to distinguish plausible uses of new forms of technology from the less likely. It can also inform current experimentation with open source virtual world software, validating design for education which is subject specific, but also technologically aware.

Glossary

CAD	Computer Aided Design
ESRC	Economic and Social Research Council
HEFCE	Higher Education Funding Council for England
IRC	Internet Relay Chat
JISC	Joint Information Systems Committtee
NCSA	National Center for Supercomputing Applications
VLE	Virtual Learning Environment
VR	Virtual Reality
VUE	Virtual University of Edinburgh

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