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Summative Assessment in Second Life: a Case Study

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Abstract

3D virtual world environments, such as Second Life, are recent additions to technologies believed to have the potential to transform educational processes, especially in distance education. The quality of the immersed environment creates a sense of presence that has been missing in traditional online learning environments. Geographically dispersed students are able to learn in an environment similar to their traditional classrooms without forfeiting the ability to learn at their own pace and in their own time zone. However, many educational establishments are still trying to understand how to use these environments effectively. Using the virtual world environment for assessment adds another level of complication and has been subjected to mixed reviews. Issues relating to matching avatars with 'real' students, accessibility, and fairness etc., make assessment in Second Life a contentious subject. This article explores a case study which used Second Life for summative assessment with a group of five MSc-level students in Applications of Bioinformatics programme.

Keywords: 3D Virtual worlds, summative assessment, Second Life, immersiveness, presence.

Summative Assessment in Second Life: A Case Study

Some researchers and educators have declared traditional learning techniques woefully inadequate to motivate today's learners. They are of the opinion that current learners demand learning processes that are flexible, fast, fun, and innovative (Duncan-Howell and Lee, 2007; Beard and Dale, 2008; Twinning, 2009). Some have also highlighted the necessity to prepare students for 'real life' as well as for their next course. Most jobs now involve the use of varying forms of technology; necessitating that students gain some soft skills using these technologies (Petty, 2004, pp. 375; Youatt and Wilcox, 2008; Moore, 2009).

Inderbitzin and Storrs (2008) believe there is an urgent need for innovative teaching that values the "'scholarship of teaching' alongside or below, traditional disciplinary research" (pp. 51). Youatt and Wilcox (2008) propose an integrated learning environment where a student is not a passive learner but is a "working apprentice in advancing knowledge and transforming lives." They suggest an integrated, embedded, and long-term culture change from within education that "prepares students to face the challenges of the future" (pp. 26). Some researchers believe technology may be the answer to enabling the sort of learning environments required (e.g. McLoughlin and Lee, 2008).

Consequently, access to vast arrays of information and online applications (e.g. social networking websites, wikis, blogs etc.), ubiquitous hand-held devices, interactive smart boards, computing equipment and software, and other tools are now common in most learning environment. However their integration in learning and effective usage to augment learning is still subject to a great deal of debate. One of the concerns to some researchers and educators is the danger of over-estimating the technological capabilities of students. Some maintain there is still a large percentage of the student body that may be considered technologically challenged (Minton et al., 2004).

Some, however, believe that even these students can benefit from the use of technology with proper planning (Moallem, 2005). For example, Longden and Yorke, (2004) believe the provision of the VLE (virtual learning environment) helps "students from a wide range of backgrounds come to terms with the demands of higher education". They believe it could be especially useful for students in the first year of a programme. They add that using web-based materials can also lead to acquisition of soft skills, which in turn, can help students gain part-time employment and enhance their employability after programme completion (Longden and Yorke, 2004, pp. 129).

Web-based interactive learning applications have been used with varying success to augment distance learning programmes; several have been successfully implemented and managed entirely online. These learning modes are generally cheaper for the learners and cost effective for businesses, allowing them to target the training for specific employees.

For all its benefits, however, online learning is not perfect: it has neither the social interaction or the instructional control characteristics of face-to-face settings (Newberry, 2005, pp. 45). 3D virtual world environments (VWE), such as Second Life, also known as multi-user virtual environments (MUVEs), may provide a solution to some of these shortcomings. Battle (2003, pp. 3) defines a virtual world as "a world with automated rules where players represent individuals and interact in real time, sharing the resources provided, in a persistent world." This definition is perhaps more applicable to Massively multiplayer online role-playing game (MMORPG) environments, because in MUVEs there are usually no rules and no pre-determined goals. However, some will argue that all virtual worlds are fundamentally game-based (Battle 2003).

What gives 3D VWEs an edge over other online learning environments is its immersive nature, achieved through the use of avatars, which represent individual users (Schiller, 2009). This provides a sense of social interaction and presence, which may be lacking in most online learning. The environment could also afford students the opportunity to repeat the learning activity as many times as necessary without incurring extra costs. Simulations of potentially dangerous 'real' life events can also be implemented safely and evaluated within the environment for causal and effect triggers (e.g. simulations of severe weather conditions such as a tsunami or a volcanic eruption to evaluate the effectiveness of emergency response systems).

However, the level of immersion in the environment will decidedly depend on the functionalities provided by the 3D VWE application and may be beyond educators' control, unless they are creators or designers of the VWE. This may have some bearing on the design of learning and assessment activities. Similarly, it is debatable how much immersion should be provided to engage learners without distracting them from the objectives of the session.

Witmer and Singer (1998) also believe the "strength of presence experienced" in these environments "varies both as a function of individual differences and the characteristics of the VE." He concludes, "individual differences, traits, and abilities may enhance or detract from the presence experienced in a given VE." Consequently, some of the teaching strategies used in a 'real' world classroom may be less effective in Second Life, but the environment may also provide functionalities that could help in developing new modes of learning because of the "affective, phenomenological and experiential" nature of the environment (Carr, 2007).

Schiller (2009) also conjectures that educators are struggling with the time and effort required to design learning processes for use in virtual environments. This may be compounded by the fact that students as well as educators require specialised skills to use virtual environments well. Specific computing system requirements and high speed internet connection specifications may also be prohibitive for the learner and could lead to some technical problems in the classroom (de Freitas et al., 2010).

Assessment in 3D VWE

The issues identified for teaching in VWEs are also relevant for assessment within these environments. While many agree about the potential for learner-centered experiences offered by the environment, which may include formative assessment and activities (Schiller, 2009), many have expressed concerns about using VWEs for summative assessment. English and Yazadani (1999) report that most students found working on projects in VWE "difficult and time-consuming." The authors also expressed some difficulty in determining how well team members worked together and how to assess overall achievement (pp. 9). Ward and Sonneborn (2009) agree, suggesting that measures must be put in place for evaluating contributions.

There are also issues around identity given that users can create multiple accounts and avatars. Boon and Sinclair state, 'Digital selves invariably lack the solidity and verifiability of the real, particularly as they are both literally and figuratively "unreal,"' concluding that this may be disquieting for some or lead to reduced levels of engagement (pp. 104). The issue of trust and truth becomes crucial, and more so when the environment is used for summative assessment. How can we be certain that an avatar belongs to the student it is meant to represent (Warburton, 2009)?

The flexibility and accessibility of the environment anywhere may present an advantage over other online tools for collaborative assessment. Students could meet in Second Life to collaborate on group activities , benefiting from the immersive environment without being physically together. Elliott (2008) believes it is particularly favourable for quick and easy peer and tutor feedback, concluding that "it permits the learner to undertake engaging and authentic tasks that can closely match learning objectives."

This paper presents a case study using Second Life for a module's summative assessment.

Summative assessment in Second Life: Study design

At the University of East London (UEL) we run an MSc programme entitled Applications of Bioinformatics. The topics of this programme include computer programming, computational exploration of biological data, and more traditional molecular biology areas. Students enrolling in the course are expected to be highly computer literate and many have already become competent in various languages before starting the course. In 2009/10 this programme ran for its third year. In the previous two years the assessment for the core Applications in Bioinformatics module included a traditional 1.5 hour exam in which the students answer two essay questions (60%), a computer practical test in which the students complete a set of computational biology tasks (20%), and a presentation on a new topic in bioinformatics of their choice (20%). For the 2009/10 session, the presentation component of the module was changed to include a Second Life summative assessment worth 20% of their final grade.

For the Second Life assessment, students were required to produce a scientifically accurate depiction of a biological molecule or concept relevant to bioinformatics. The students were provided with detailed information and examples of what was expected from them at the beginning of the semester. They also were informed that their grade would be based on the visual representation of the object generated in Second Life as well as the biological accuracy.

In 2010 there were five international students from India and Africa (three males and two females) taking the Applications of Bioinformatics module. Throughout the module students had lessons on scripting in various languages and two 3-hour and one 1-hour sessions on building and scripting in Second Life. All students enrolled on the module were already familiar with Second Life from the previous semester, when simulations of lab experiments were used to complement more traditional practical laboratory classes (described in Cobb *et al.,* 2009). The students were then left to develop their building skills and construct their chosen objects in their own time. The students had eight weeks from the initial description of the assessment task until submission. Submission was in the form of a printed screen shot of the object so that staff could identify which object was created by which student. The objects were also viewed in Second Life by the assessors. Students were invited to leave their objects on exhibit for other bioscience students to view. Following the assessment all students were invited to complete a questionnaire on their experience of the assessment.

Study results

Five students participated in the process, and all five students submitted an object on time and received marks ranging from 50-70%. In all cases students lost marks because of a lack of detail or an error in the scientific depiction of the chosen object. Some examples of the objects produced by the students are shown in Figures 1-3. Two students produced a model of a DNA molecule. One of these was scientifically inaccurate but included scripting to make the molecule rotate. The other was scientifically accurate but was not as detailed in representation and movement. The remaining three students chose to produce items showing the steps involved in a process. Two students did this by combining poster boards with objects. A third student did this entirely with objects scripted to move accordingly. Two students chose not to leave their objects on display on the UEL Second Life Island.

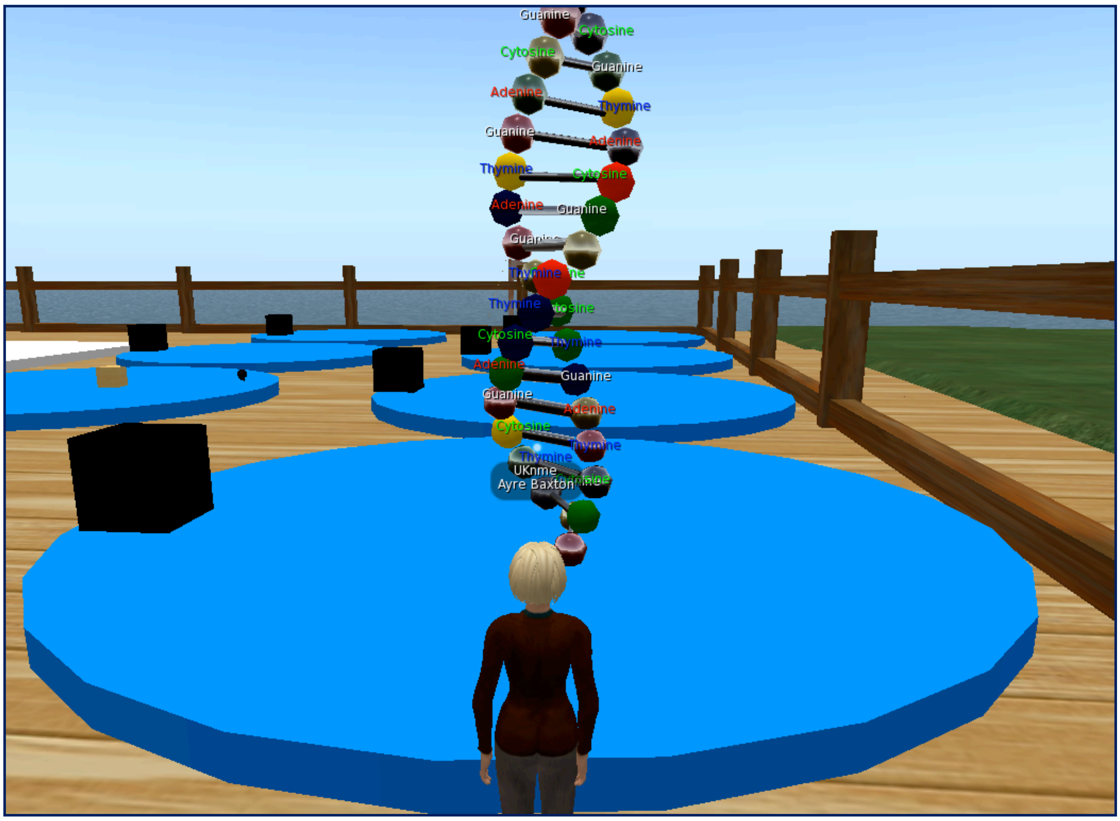

Figure 1: A DNA molecule.

The external examiner for the module viewed all objects submitted under the assessment and praised the assessment design for combining the two areas of computer modelling and biological knowledge.

Findings

The group of five students were given a questionnaire to complete at the end of the process. Three of the five students responded, one female and two male students. Two respondents referred to the module as the "Second Life module" and all three had positive comments for the process. One of the students remarked:

Figure 2: A graphical representation of the steps in bacterial cloning.

> "The second life module was an inspiring module. It was a bit challenging initially understanding the tools and platform but the instructor assisted us greatly. Now based on the skills acquired, (sic)I believe second life is a good business opportunity for me to explore."

All three students indicated that they were unfamiliar with Second Life or any other virtual world environment before the module, finding the two 3-hour and one 1-hour sessions on building and scripting adequate preparation for the task. Two of the three students were experienced in scripting prior to undertaking the module and found using the Linden scripting language (LSL) in Second Life easier than other programming and scripting languages they used. One commented of LSL:

> "It is very similar to JavaScript (sic)and C++, so with my previous knowledge of programming it was a bit easy to understand the syntax, because Second Life syntax are very direct and user friendly."

Asked if they felt any of the skills gained are transferable, all three responded affirmatively. Two of the three respondents indicated that they will continue to use Second Life, with one looking forward to starting a business in the virtual environment. One commented:

> "Learnt (sic) how to create and script in virtual environments. It enhanced my creativity, and presented a new platform to create 3D virtual images, which is a very powerful skills needed in some industries today."

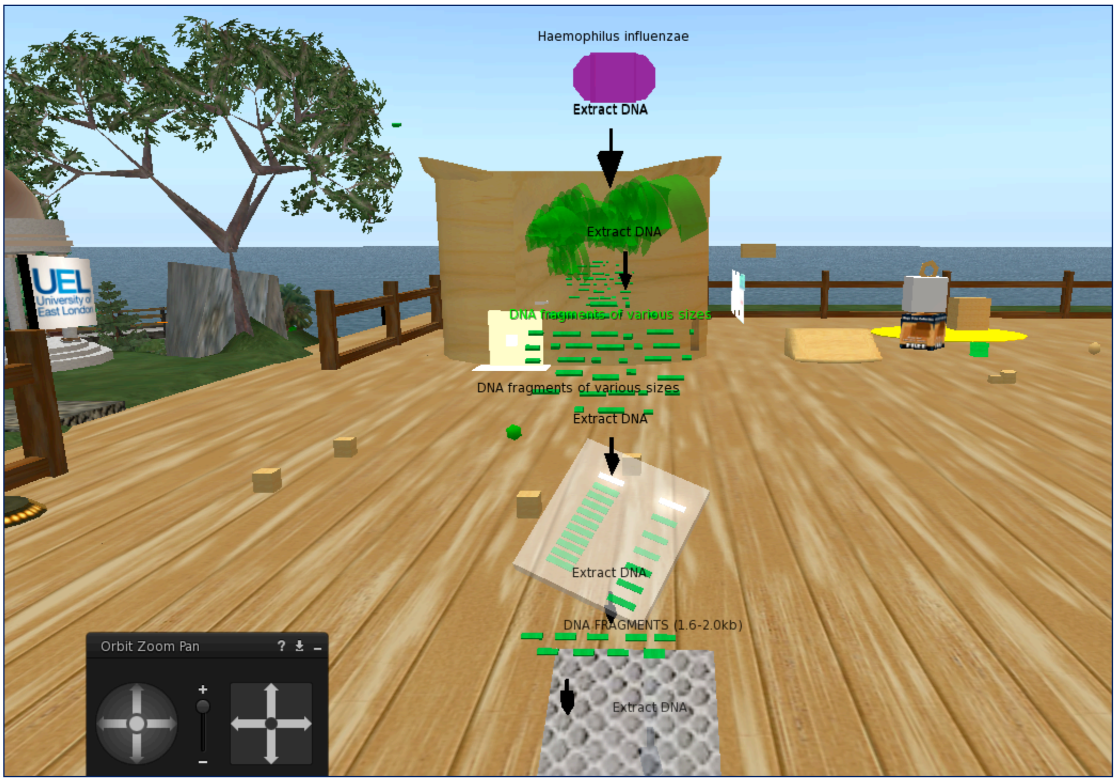

Figure 3: A 3D model of the first stages of a genome sequencing project.

Two of the 3 respondents thought it was 'fair' to use Second Life as part of the module summative assessment, but one of them commented:

> "The relevance of second life (sic) should be made more obvious and how it relates to a Bioinformatics."

In general, using Second Life seemed to be a positive experience for the students, although they felt that they could have benefited from more tutorials on building, scripting, and, in particular, on 3D modelling. In spite of the amount of time given to them, the students also commented that they felt rushed to complete the coursework.

Conclusion

No empirical data on the avatars' activity in Second Life was collected as work-flow evidence for the tasks. Such data could have been useful as evidence of the students' avatars' participation. Arrival and departure in Second Life was logged for the students' avatars, but it would have been useful to log their activities. In the absence of such data, it is difficult to confirm what the avatars did in Second Life or if they worked on the objects submitted for assessment. It is also important to note that the size of the group and their previous experience in scripting and programming may have had a bearing on the overall positive response from the students.

Tutors observed that students did not feel intimidated by working in an unfamiliar environment; they seemed to embrace the process and were quick to understand the Linden Scripting Language (LSL) syntax. The students also seemed deeply engaged when they were able to create objects that could interact with the environment.

Future research is needed to observe assessment involving larger groups and collaborations. However, identity may be more of an issue with larger group, and measures to link students with their avatars and activities in Second Life may be necessary. This may include logging their activities and movements during the assessment process.

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