Interoperability, Learning Designs and Virtual Worlds: Issues and Strategies

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ABSTRACT
Given the relatively high costs associated with designing and implementing learning designs in virtual worlds, a strategy for the re-use of designs becomes imperative. IMS LD has emerged as the standard for the description and expression of learning designs. This chapter explores some of the issues associated with using the IMS LD specification for learning designs in virtual worlds such as Second Life and multi-player online role playing games such as World of Warcraft. The main issues relate to the inadequate description of collaborative activities and the inability to alter the design 'on-the-fly' in response to learner inputs. Some possible solutions to these problems are considered.

INTRODUCTION
Since 2003, the virtual world of Second Life has captured the imagination and ire of the general public, on the one hand concerned at the implications and complications for a first life, and on the other intrigued by the possibilities that such a flexible environment affords. Educators fall into this latter category. Higher education institutions have been quick to spot the possibilities for innovative teaching and learning in worlds such as Second Life, Twinity and Active Worlds. Given the escalating demands on educators' time and the increasing scrutiny given to the quality of education, it is prudent to consider the possibilities afforded by reusability of key components of educational designs, in turn leading to greater time efficiencies. Instructional Management System Learning Design (IMS LD) is a standard that has emerged as a way of describing learning activities while emphasizing the possibility of reuse, interoperability and adaptation.

This paper will briefly describe the IMS LD system and the nature of Massively Multiplayer Online Role Playing Games (MMORPGs) such as World of Warcraft, EVE Online and EverQuest II, and Multi-User Virtual Environments (MUVEs) such as Second Life, Active Worlds and Project Wonderland, before considering how these might interact. Two sets of issues relating to MMORPGs, MUVEs and IMS LD have been identified: 1) those issues not specific to MUVEs and MMORPGs but still significant to them, and 2) those issues more specifically relevant to them. Various strategies have been formulated to overcome these challenges and a discussion of these will constitute the latter part of this chapter.

What is 'Learning Design?'

Learning Design provides a vocabulary for describing teaching and learning processes, and is itself pedagogically neutral (Koper & Olivier, 2003: p. 2). The design becomes explicit and can be reflected upon by the designers themselves or by others who may further refine the design and share it within a community (Koper & Tattersall, 2005: p. 3, Koper & Manderveld, 2004: p. 538). Instructional Management System Learning Design (IMS LD) has emerged as the standard. It allows the expression of lesson plans as formally expressed Units of Learning (UOL). Learning designs with this specification are expressed in Extensible Markup Language (XML), making them machine-readable, i.e. learning designs can be run using IMS LD compatible software such as CopperCore or .LRN (which can be embedded within a learning management system), rendering the delivery and management of courses more economical (Koper & Tattersall, 2005: p. 3; Burgos, Tattersall & Koper, 2007: pp. 2661-2662).

IMS LD is based on Educational Modelling Language (EML) created by Rob Koper and his team at the Open University of the Netherlands (Koper & Tattersall, 2005: pp. 2-3). It is defined as 'a semantic information model and binding, describing the content and process within a "unit of learning" from a pedagogical perspective in order to support reuse and interoperability' (Koper, Rodrígues-Artacho, Lefrere, Rawlings, & Rosmalen, 2002: p. 7; Amorim, Lama, Sánchez, Riera, & Vila, 2006: p. 38). Building on this language, IMS LD was designed to 'to provide a containment framework of elements that describe any design of a teaching-learning process in a formal way' (Koper, Olivier and Anderson, 2003 cited in Caeiro-Rodriguez, Llamas-Nistal & Anido-Rifón, 2005: p. 4).

The IMS LD specification describes a set of activities (learning and support) to be performed by participants with either the roles of learner or staff, in environments consisting of resources and services (Caeiro-Rodriguez et al., 2005: p. 4; Amorim et al., 2006: pp. 39-40). These elements are organized according to a theatrical metaphor, i.e. role-parts are those roles assigned to activities; an act may consist of several role-parts which may be performed synchronously; acts performed in sequence constitute a play; and several plays may be considered sequentially in a method (Koper & Olivier, 2003: p. 6; Caeiro-Rodriguez et al., 2005: p. 4; Hernández Leo, Asensio Pérez & Dimitriadis, 2004: p. 351). There are three levels of LMS LD, designated A, B and C with A being the entry level. Levels B and C offer more flexibility with the introduction of notifications and conditions. Even so, IMS LD is a relatively new specification and the implementation of the standard is patchy and has not been implemented on a large scale (Koper & Tattersall, 2005: p. 4).

Multi-user Virtual Environments (MUVEs) and Massively Multiplayer Online Role-playing Games (MMORPGs)

A Multi-User Virtual Environment (MUVE) is a computer-, server- or internet-based virtual environment that allows participants to move around and use various forms of communication (text chat, voice chat or instant messaging). It allows participants to create a virtual identity which persists beyond the initial session (Maher, 1999: p. 322; Ritzema & Harris, 2008: p. 110). The term was coined by Chip Morningstar and F. Randall Farmer in 1990 (see Morningstar & Farmer, 1991: p. 273) and is often used interchangeably with 'Virtual World' (VW) (see Castranova, 2001: pp. 4-5). Second Life is one of the most well-known MUVEs in part due to the intense media scrutiny it has attracted, but predominantly because the content is created almost exclusively by users. At the time of writing, it boasts nearly sixteen million user accounts; one and a quarter million residents having logged in during the previous sixty days (Linden Lab, 2009). Though Massively Multiplayer Online Role-Playing Games (MMORPGs) such as World of Warcraft resemble MUVEs in many ways, including users sharing the same virtual space and persistence of characters, they differ in important ways too. In MUVEs there are no 'levels' to be worked through or imbedded fiction that directs the activities of participants; instead the experiences are shaped by users (Ondrejka, 2008: p. 231).

MUVEs and MMORPGs are populated by motional 'avatars'; the term is derived from Sanskrit and used in Hindu mythology to denote the earthly form adopted by a deity, commonly Visnu (Leeming, 2001). In MUVEs and MMORPGs, this term denotes the representation of a character, controlled either by an individual or a software agent in the case of a 'bot', which acts somewhat like a virtual automaton (Duridanov & Simoff, 2007: p. 4). The choice of avatar can reflect a player's personality, gender or ethnicity. It is also possible for a participant to assume a completely different identity which in itself may constitute a significant learning experience, particularly important in role-playing scenarios. In addition, they are able to communicate with large groups of avatars (via voice- or text-chat or asynchronously with podcasting or inworld, text-based documents called notecards) or communicate more intimately with a single avatar (using instant messaging) (Tashner, Riedl & Bronack, 2005: p. 6). Avatars are able to interact with and modify the virtual environment and are even able to interact beyond the confines of the MUVE if objects are linked to web pages (called 'web on a prim' in Second Life) (Tashner, Riedl et al., 2005: p. 6).

The diversity of educational contexts enabled by MUVEs and MMORPGs provides an assortment of experiences that accommodate a range of learning styles. Fleming identified four types of learning styles: (a) visual; (b) auditory; (c) reading/writing; and (d) kinesthetic, tactile, or exploratory, resulting in the acronym VARK (Fleming & Baume, 2006: p, 6; Bonk & Zhang, 2006: p. 250). Beyond recognizing that these learning styles exist, learners born after the mid-1970s expect that learning will be responsive to their preferred style (Bonk & Zhang, 2006: p. 250). Given the diversity of students attending university, it seems prudent to seek out an environment where all learning styles can be accommodated. A MUVE such as Second Life could be such an environment, as long as careful consideration is given to the planning and implementation of learning strategies.

Such a design would ideally imbed more authentic learning through collaboration, teamwork, problem-based and adaptive learning, in alignment with those trends identified by Bonk, Kim, and Zeng (2006, pp. 550-568; Bonk & Zhang, 2006: p. 251). The increasing importance of hands-on learning in the next couple of years was similarly flagged; already glimpsed in the rising prevalence of realistic and complex, collaborative simulations, interactive scenarios and commutative news stories (Bonk & Zhang, 2006: p. 251). This in part could be achieved in MUVEs and MMORPGs through content creation in accordance with the learner's own ideas, learning goals and interests. This approach necessitates the acquisition of certain requisite skills which could be incorporated into educational designs favoring collaboration, peer-to-peer teaching and the creation of new types of 'learning communities' for both students and educators, underpinned by mediated immersion (Ondrejka, 2008: pp. 229-230; Clarke & Bede, 2005: p. 1; Tashner, Bronack, & Riedl, 2005: p. 2117).

Issues with IMS Learning Design and MUVEs and MMORPGs

Reusability of learning environments and their constituent parts has emerged as a significant agenda for learning design (Harper, 2003: p. 24). As Paramythis and Loidl-Reisinger indicate, one of the main reasons for striving for standardization for e-learning is cost. For example, the creation of Religion Bazaar, an educational build in Second Life used to facilitate student-centered learning for studies in religion students at the University of Queensland, included the purchase of virtual land, terraforming (virtual landscaping), the payment of tier fees (rent), employing a specialist builder to create a number of buildings, the creation of thirty avatars of various races and genders, equipping those avatars with a large variety of religious outfits and religious and cultural artifacts many of which had to be created *ex nihilo*, employing a specialist 'scripter' to animate objects and avatars such that they could interact meaningfully, and importantly, consultation with instructional designers to create an educationally meaningful and effective design. Once created, Religion Bazaar enabled students to role-play in religious rituals and create historical reenactments as part of their undergraduate studies. This design and its implementation cost in the vicinity of $USD25 000 without taking into account the extra time support and teaching staff spent on the project (see Robinson, 2008). This project is just one of hundreds – if not thousands – designed and built by higher education institutions in Second Life alone (see Kay, 2007). Many other institutions have invested heavily in other virtual worlds such as Active Worlds (for example, see Dickey, 2005) or Croquet Project. As it stands today, the development of an adaptive learning environment (ALE), such as found in a MUVE or implicit in the deployment of a MMORPG, incurs high initial costs (in terms of time and other resources) and high ongoing maintenance costs (p. 181). The development of a mechanism for reuse and interoperability, as implied by the conformation to IMS LD standards, would protect the substantial investment necessary for the development of an ALE; should allow for interoperability in different environments; and the possibility for aggregation of content by subsequent users (Paramythis & Loidl-Reisinger, 2004: pp. 181-182).

At this time, there is no way to package a MUVE or MMORPG so that it can be embedded into a LD for ready use in another environment due largely to the fact that they usually exist on external servers which are able to be accessed by an unlimited number of users at any given time. Those environments created with OpenSim, an open source server platform for hosting virtual worlds, and Linden Labs' Nebraska are the exceptions, being able to be installed on local servers (Linden, 2009). In order for the MUVE or MMORPG to be used within a LD, it has to be provided as a learning object within an environment (see Rob Koper & Olivier, 2003: p. 7). The use of MMORPGs and MUVEs as

educational settings, while not mainstream has existed in some form for in excess of a decade, yet there is scant literature that addresses the topic of using IMS LD with MUVEs or MMORPGs. Consequently, in order to approach this topic, it was necessary to survey the literature relating to the IMS LD specification with a view to identifying those problems not directly associated with but still relevant to MMORPGs and MUVEs because of the favored instructional methods in use in these environments. In addition, those challenges more especially associated with using IMS LD with MUVEs and MMORPGs were also identified.

Problems associated with IMS LD and activities taking place in MMORPGs and MUVEs, but not specific to them

MMORPGs and MUVEs excel as collaborative workspaces facilitating the creation of learning opportunities anchored in real-world experiences (Childress & Braswell, 2006: p. 190). Role-playing, once only possible in a face-to-face context, can now be performed virtually while experimenting with gender and identity as well as adopting unfamiliar roles. In addition, learners can collaborate to create content in the form of buildings, artworks or vocational resources. They can work together to plan and implement a virtual enterprise, for instance a store selling virtual goods such as a clothing store, or services such as a music venue or instruction in a particular skill such as scripting or building. In an example amply demonstrating the collaborative possibilities afforded by virtual worlds, faculty from Johnson and Wales University formulated an experiential education activity in Second Life for students involved with Global Outreach Morocco. This interdisciplinary, community-based organization is concerned with promoting economic development in the country through increasing tourism and travel (Mason & Moutahir, 2006: p. 32). The students from disciplines including business, tourism and technology, worked collaboratively to create a 'virtual Morocco' by building popular landmarks, including the Hassan II Mosque, to be used as a marketing tool but also to raise funds through the sale of virtual goods (Mason & Moutahir, 2006: pp. 33-34). In large part, what makes MMORPGs and MUVEs so appealing to educators is this enormous potential for the design and implementation of a rich variety of collaborative learning activities.

Early e-learning standards only supported the use of a single learner (e.g. SCORM) which rendered them unsuitable for encoding the fertile collaborative activities afforded by MMORPGs and MUVEs. IMS LD offers a considerable advantage, allowing the integration of discussions and more complex collaborative approaches (Koper & Tattersall, 2005: pp. 4-5). Even so, there are a number of problems trying to describe the kinds of collaboration found in these environments using IMS LD. Obviously, there are often significant timing issues associated with collaboration. For example, one piece of a task to be undertaken by a learner may not be able to take place until another part of the task is completed by a different student; timing is crucial such as with a role-play with learners entering and leaving the activity at different times. Caeiro-Rodriguez, Llamas-Nistal and Anido-Rifón identified three types of timing issues associated with collaborative learning. These are:

1. Synchronization patterns, so that an activity undertaken by one learner occurs in temporal relation to another task undertaken by another learner according to the conditions of the collaboration (as in the previous example).
2. Scheduling patterns, for the determination of times when an event will occur or a product will become available, for example deadlines. And,
3. Allocation patterns, to determine how much time is spent on each task (pp. 11-12).

While some of the temporal elements are able to be defined (e.g. activity deadlines), most are not, significantly hindering the expression and subsequent management of collaborative activities (Caeiro-Rodriguez et al., 2005: p. 12). Additionally, it may be necessary for a group of students to come together to work through a 'treasure hunt' or to work together to build a model, event or role-play. Furthermore, in simulations – particularly in MUVEs but also in MMORPGs – there are often virtual actors ('bots') that may play the role of a patient in a medical simulation or act as virtual guides for example. It is possible for virtual actors to take the roles in IMS LD (Payr, 2005: pp. 211-212). Even though the distribution of learners or bots into groups is expressly supported, as is the ability for

students to take on the same roles at different times (Koper & Tattersall, 2005: pp. 4-5; Hernández Leo et al., 2004: p. 350), it is still quite difficult to describe the formation of groups in IMS LD and this needs to be overcome before group work, whether in a MUVE, MMORPG or other environment, can be adequately described (Koper & Tattersall, 2005: p. 4). Given the nature of the sorts of activities taking place in MUVEs or MMORPGs, this is entirely restrictive (Hernández Leo et al., 2004: p. 350). In the current iteration of IMS LD, groups are defined via 'role concept' (Berggren et al., 2005: p. 6) but there is no specification to determine how members within those groups will interact (Santos, Boticario, & Barrera, 2004): p. 5). The only indication of interaction is via a service, only two of which are collaborative to any degree: discussion forum and email (Hernández Leo et al., 2004: p. 350). In order to overcome these difficulties, Hernández Leo, Asensio Pérez and Dimitriadis proposed an addition to the IMS LD service definition; that of 'group service'. This would accommodate those characteristics not currently allowed by IMS LD including the type of awareness information needed and provided by the service, the floor control policy that guides learners' actions, the communication skills required by these learners, and so on. However, even with these proposed amendments, deficiencies will still occur in some areas (p. 351). It was believed that some of these issues could be addressed in a further iteration of IMS LD, however, to date this has not been forthcoming.

Santos, Boticario and Barrera proposed another viable solution that would overcome some of the deficiencies of that proposed by Hernandez *et al*. Their solution was designed to 1) integrate the use of services within the context of the activity, 2) control any runtime adaptations from the design itself, and 3) facilitate feedback to the author (Santos, et al., 2004: p. 5). They used aLFanet (for Active Learning For Adaptive internet) that includes an authoring tool which facilitates the creation of courses utilizing the IMS LD standard by way of templates. Even so, the authors admitted this process was still quite difficult (Santos, et al., 2004: pp. 3-4). In order to deal with the deficiencies with regards to collaboration in IMS LD, two objectives were identified: 1) to identify the resources –both contents and services – to be used in the design of collaborative activities, and 2) to assign maximum and minimum values to various components within the activities, in order to regulate the runtime environment. This required a number of pieces of information to be supplied by the author of the particular LD including a list of learning objects including metadata specified by IEEE-LOM (a standard for learning object metadata), the name of the folder where learners are required to lodge their files, an activity description containing specific links to learning objects and service elements, and so on (Santos, et al., 2004: pp. 3-4). To facilitate the re-use of the design by adapting it to a novel context or purpose, the author is able to specify whether or not the design has been purposed for re-use, but also to designate which components are considered central to the design and need to remain unchanged. Conversely, the author is also able to identify which components are most suitable for adaptation. In addition, parameters for redesign can be supplied such that the runtimes for each activity can be refined. This in turn influences how the activity will be presented to the learner and how the services can be used, dependent on the characteristics of the individual user (Santos, et al., 2004: pp. 6-7). An Audit module also provides feedback to the author by comparing the initial learning design with the performance of the learners (Santos, et al., 2004): pp. 3-4).

Beyond the difficulties associated with collaboration and IMS LD in MUVEs and MMORPGs, the inability of IMS LD to be altered while already running is a significant issue. It is sometimes crucial for students or instructors to edit the learning activities as situations challenge. This would be a common enough problem in a MUVE or MMORPG where constructionist learning is paramount and learners bring to the activity a wide variety of experiences and skill sets. Students are encouraged to use their prior experiences to contribute to the collective knowledge of the group and collaborate with peers, always adapting to emerging, and often unpredictable, circumstances. In the IMS LD, students are not able to edit the activities. Though staff can be assigned varying roles giving them a greater or lesser control over the running of the activities, the role of learner is inflexible in this regard. Learners need to be able to have some administrative rights so that they can lead groups, monitor activities and assess participation (Berggren et al., 2005: p. 6).

As an IMS LD is proscriptive, it is not possible to alter it 'on the fly' in response to changing circumstances using Reload (as an authoring tool) or with CopperCore (as a player) for example. Sometimes learning experiences are designed to be adaptive according to the characteristics of the individual learner or in response to learning outcomes. But in some cases, unpredictable characteristics of the learning environment itself may render an alteration of the learning design desirable. MUVEs and MMORPGs are generally not closed environments (though it may be possible to make them so under certain circumstances). Avatars not associated with the host institution are able to wander into a learning activity or online colleagues might drop by to see what is happening. Second Life, in particular, is much favored by educators and there is a strong sense of community. It is possible – and even likely – that if another educator heard about a novel assessment piece or learning activity, they might come by and observe. These chance meetings are excellent opportunities to enhance the learning experience and would be encouraged under normal circumstances, but are not compatible with the proscriptive nature of IMS LD. In a different scenario, another avatar from outside the original grouping may be a content expert and offer advice or valuable information or suggest an alternative method but again this transgression of the original activity could not be accommodated by IMS LD, even though the educational activity would be improved by that person's contribution via their avatar. In a less positive situation, participants may have difficulty with hardware, software or bandwidth. It is not uncommon for residents to lose the ability to use voice chat in Second Life for example. This could significantly impact on a role-play activity or in the production of a machinima (a misspelled amalgamation of 'machine' and 'cinema' which designates an animation crafted from a gaming or MUVE experience) as an assessment piece. Lack of bandwidth might preclude the use of builds that place a high load on the system. Similarly, someone learning in a MMORPG, such as World of Warcraft, might find their avatar killed by someone from a raiding guild, again derailing the original learning activity. Ideally, this would lead to a redesign or modification of the learning design.

At this time, it is not possible to alter or adapt an IMS LD while it is running (Berggren et al., 2005: p. 7). In contrast, a learning management system such as Moodle, which is based on socio-constructivist principles, enables activities to be adapted on the fly in response to this ideology. One possible way of overcoming the proscriptive nature of IMS LD would be to use an IMS LD-compliant authoring tool within Moodle. This could take the form of a 'template editor', supporting the creation of more course formats (a course is roughly equivalent to a UOL in IMS LD) that support roles and conditions. It would then be necessary to be able to export a later iteration of a LD while stripping user data, possibly through the development of an improved XML export system (Berggren et al., 2005: pp. 8, 12).

Problems with IMS LD Specific to MMORPGs and MUVEs

As previously flagged, very little has been done in regard to MUVEs and MMORPGs and IMS LD. There has been some work done on IMS LD and generic games and it is this literature that provides some insight into those challenges arising from the use of IMS LD with MUVEs and MMORPGs. Video games, MMORPGs and MUVEs have many characteristics in common: they provide short feedback cycles, they are immersive and highly interactive (see Moreno-Ger, Burgos, Sierra, & Fernández-Manjón, 2007: p. 247). In addition, like an activity in a MUVE or MMORPG, a video game can behave differently each time it is run. This becomes desirable when dealing with a learner cohort encompassing a large range of experience, skill levels and competencies. The adaptive nature of a game, MMORPG or activities within a MUVE, is an efficient way of providing appropriate learning experiences to such a diverse cohort (Moreno-Ger et al., 2007: p. 248).

Already these environments are being used within an educational context. But for the most part, the activities taking place within these environments run independently of the current e-learning systems as collateral activities, leading to a fundamental disconnect between the educational setting and the activity taking place within the MUVE or MMORPG (see Burgos, Tattersall et al., 2007: pp. 2658-2659; Burgos, Moreno-Ger, Sierra, Fernández-Manjón, & Koper, 2007: p. 256). It is desirable to forge a link between the activity and setting so that the activities that precede it contribute to its iteration and so that it in turn will add something to the system and hence, the activities that follow it.

This is not possible when there is no communication between the activity in the MUVE or MMORPG and the e-learning system in use which provides the overarching structure to the UOL (Burgos, Tattersall et al., 2007: p. 2660).

A UOL running within a Learning Management System (such as Blackboard or Moodle), could involve a student or group of students formulating a detailed business plan (in the form of a wiki for example) in order to run a business making clothes for sale in the popular MUVE, Second Life. The activity would run for a specified amount of time and interim goals would be set. The student could be responsible for assembling the clothes or arranging for the clothes to be made, advertising the clothes and collecting fees. This activity could run for a specified period of time and comparisons could be made between the results of the actual activity and the proposed goals as defined in the business plan. The results would be collected in the LMS and feedback and support would be given along the way. Depending on the correlation between the actual results and the projected results, the activity could be run again with the parameters adjusted or the student may be able to move on to a more advanced activity with others who have achieved similar results. A student with prior experience in retail could be expected to excel in this kind of activity, and in order to continue to challenge that student so that he or she continues to learn in a meaningful way, the economic conditions or cost of materials could be increased or the student could be forced to move the business to another area with a different socioeconomic demographic.

Burgos, Tattersall and Koper writing about generic, educational games have suggested that a communication dispatcher be created which sits between the pedagogical modeler and the game. And this remains a possibility also between a MUVE or MMORPG and the pedagogical modeler. This would facilitate the transmission of variables in both directions, ensuring the most appropriate learning experience (Burgos, Tattersall et al., 2007: p. 2660; Burgos, Moreno-Ger et al., 2007: p. 257). This would have the advantage of being able to completely control the flow of the UOL and the MUVE/MMORPG activity within it instead of having the activity take place in parallel to the flow of the UOL. This was demonstrated by Burgos et al. with a generic game called *Caminatas*, developed by Burgos at the Open University of the Netherlands, using an IMS Learning Design editor such as CopperAuthor or Reload LD Editor (pp. 2664-2665). Even so, they acknowledged that the implementation of this solution was not yet possible, due to the complex nature of the task and the state of the available software, including IMS LD. In addition, there was not yet appropriate software to act as a communication dispatcher between the game (the example they used) and the educational wrapper (p. 2665).

Moreno-Ger, Burgos and Sierra came to a similar conclusion using a game created using the game authoring software <e-Adventure> (see Moreno-Ger et al., 2007). A UOL entitled *The Art and Craft of Chocolate* was created and deployed and consisted of three stages within an LMS:

> 1. Provision of traditional content and deployment of tests to determine the learner's level of knowledge about the topic.
> 2. Deployment of the game at a level commensurate with the learner's level of knowledge.
> 3. An in-game assessment is used to grade the learner or can be used to determine the rest of the learning flow (Moreno-Ger et al., 2007: p. 250).

They determined that the adaptation to IMS LD consisted of two stages (similar to those suggested above by Burgos et al.):

> 1. The game should infer adaptation properties from the UOL execution.
> 2. And that feedback from the game should be fed back into the UOL execution environment (Moreno-Ger et al., 2007: pp. 256-257).

The UOL was run on a SLeD (Service-based Learning Design) player which functioned as the front end for a CopperCore Runtime (CCRT) environment. The CopperCore Service Integration (CCSI) layer allowed the integration of different services, such as forums or assessments, in the CopperCore

environment (Moreno-Ger et al., 2007: pp. 257-258). Neither the SLeD player nor IMS LD was set up to accommodate adaptive games so the CCSI layer had to be adapted to create a new service called 'Adaptive Game Service'. This was possible because the LD specification allows a certain flexibility when defining the services needed for the various activities and this is implemented by the CCSI which facilitates the definition, implementation and connection to these services (Moreno-Ger et al., 2007: p. 258). So again, there is a theoretical solution which would enable games, MMORPGs and activities in MUVEs to have some effect on the learning flow but the solution does not yet exist using LMS LD. If it did exist, the activity could run through an IMS LD compliant LMS. There has been some move in this direction by both Moodle (Berggren, 2006; Berggren et al., 2005) and Blackboard (Blackboard Inc., 2004). IMS Shareable State Persistence (IMS SSP) is a specification that allows passing state information from one learning object to another, so that for example, results of an assessment or game can be utilized to determine the further course of a learning sequence (Payr, 2005: pp. 210-211).

Re-use

Given that the aforementioned difficulties can be overcome, three main tasks have been identified by Pernin and Lejeune (2006) in order for an IMS LD, including one incorporating the use of a MUVE or MMORPG, to be reused. The first task includes the analysis by way of comparison of the IMS LD as it was originally envisaged with its refinement or modification in the light of a more detailed examination of the context and content and finally, the actual iteration of the scenario. This enables an evaluation of the effectiveness of the design but also aids a determination of its suitability for re-use in a different context (Pernin & Lejeune, 2006: pp. 9-10). This contextualization is the second step in the process. The variability of contexts in which the IMS LD will potentially be played out will to some extent determine the suitability for re-use of the scenario. If the IMS LD is to be re-used in a very similar context, then it could be expected that the LD will be highly suitable for re-use, with progressive improvement of the designs. If the context for re-use is markedly different, then the IMS LD may not be suitable for re-use without significant modification. A determination will need to be made as to whether it is more time and cost effective to use an existing IMS LD for iteration in the new context or whether it would be more efficient to create one from scratch. If the IMS LD is suitable for re-use then it will need to be catalogued, the final step in this process (Pernin & Lejeune, 2006: p. 10).

Alternative solutions

In the meantime, there has been some move towards a solution not using IMS LD with the creation of Sloodle. Sloodle is an Open Source GNU-GPL project which integrates the MUVE Second Life with the learning-management system, Moodle. Sloodle comes as a Moodle module (Sloodle, 2008a). Students are registered to a Moodle site and then are required to log into Second Life and take their avatars to the 'Sloodle Access Checker' or in more recent versions of Sloodle, to an enrolment/registration booth (Sloodle, 2008b: p. 5). An object distributor allows content to be passed to Second Life avatars via Moodle so that students' avatars can be equipped with the materials they need to perform an activity in Second Life. The staff member is not required to be logged into Second Life to do this. Students can text chat next to a Sloodle Web Intercom in Second Life and the chat is logged and mirrored on a forum on the Moodle page (Sloodle, 2008b: p. 6). Other tools include a glossary tool, a blogging tool, voting and quiz tools and a 'prim' dropbox so that students can lodge objects created in Second Life with Sloodle. These tools link directly to the Moodle Gradebook (p. 7) and through some sort of adaptive release, can determine subsequent activities.

Developers of another prominent LMS, Blackboard, are similarly striving to create some interactivity between Second Life and their own LMS. A $US25 000 grant was awarded to Ball State University to develop a system to guide access to Second Life resources using the adaptive release features of Blackboard. Though Blackboard activities will determine the nature of the Second Life experience for students, it is unclear as to whether or not the Second Life experience impacts on the experience within Blackboard (Blackboard Inc., 2008). In addition, there are means of assessing in Second Life

whereby quizzes and the results of quizzes or other activities can be collected and stored at a third party website (see www.deltalprinting.com) without the specific requirement for a LMS.

Conclusion

This chapter has attempted to introduce the topics of IMS LD and MUVEs/MMORPGs. Though there is not a literature dealing specifically with this topic, those issues that may be more often encountered in MUVEs and MMORPGs have been identified, specifically those associated with IMS LD and various aspects of collaboration and also the inability to adjust IMS LD on the fly in response to changing circumstances. Through identifying those issues common to gaming and multi-user environments and IMS LD, it becomes possible to formulate strategies to deal with these challenges. The possible resolution of these issues has been discussed, specifically through the addition of a service, specifically 'groupservice', even though it is unlikely to address all of the issues raised. Additionally, these issues may be addressed through the use of IMS LD templates to be used in aLFanet.

Further, those issues that relate more closely to MUVEs and MMORPGs were identified, specifically how the results of the activities that take place in these environments influence subsequent learning activities within the UOL and vice versa. The solution to this problem remains theoretical, with the creation of a communication dispatcher to sit between the game, MMORPG or MUVE and the LD being proposed. Looking outside of IMS LD, there are examples where MUVEs do interact with a LMS to influence subsequent activities. This is achieved using Sloodle, as a component of Moodle interacting with Second Life and is also being trialed with Blackboard (again with Second Life).

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Key Terms & Definitions

Avatar: The representation of a user in a virtual environment. In virtual worlds these representations are able to move and interact with the environment and each other.

Instructional Management System Learning Design (IMS LD): A standardized vocabulary for describing teaching and learning processes. It allows the expression of lesson plans as Units of Learning (UOL).

Learning Management System (LMS): A software program that facilitates the enrolment of students, administration, deployment of assessment and the aggregation of content in an elearning program or course. The term Virtual Learning Environment (VLE) is frequently used as an alternative in the European context. Examples of common LMS include Blackboard, Moodle, Sakai and WebCT.

Massively Multiplayer Online Role-playing Game (MMORPG): A virtual environment in which simultaneous users can log on and participate in role-playing activities. There is generally a narrative that drives the action in the game, with ‘levels’ or ‘stages’ to be worked through. The environment persists once users log off.

Multi-user Virtual Environment (MUVE): A Multi-User Virtual Environment (MUVE) is a computer, server- or internet-based virtual environment that can be accessed by multiple users simultaneously. The virtual environment persists after individual users have logged off.

Second Life: A MUVE commonly used by educators, created in 2003 by Linden Lab. It has around 16 million users. A separate Teen Grid for 13 to 17 year olds also exists.