Reusable Learning Designs and Second Life: Issues and Strategies

Helen Farley
Centre for Educational Innovation and Technology
University of Queensland, Australia
h.farley@uq.edu.au

Abstract: Since 2003, the virtual world of Second Life has captured the imagination of educators, intrigued by the possibilities that such a flexible environment affords. 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 and adaptation. This paper examines some of the issues associated with reusability of learning designs created for use in Second Life; specifically those utilizing the IMS LD standard. These issues are divided into two groups: those that are problematic to but not specific to learning in Second Life and those that are more characteristic of Multi-user Virtual Environments (MUVEs). Some possibilities for overcoming those issues are also examined.

What is learning design?

Learning Design provides a vocabulary for describing teaching and learning processes, and is itself pedagogically neutral (Rob 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 (Rod Koper & Manderveld, 2004, p. 538). Instructional Management System Learning Design (IMS LD) has emerged as the standard, allowing 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, rendering the delivery management of courses more economical (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 (R. 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' (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 (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 (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 (p. 4). 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 (R. Koper & Tattersall, 2005, p. 4).

Multi-user Virtual Environments (MUVEs)

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 (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 probably due to the intense media scrutiny it has attracted.

MUVEs are populated by motional 'avatars'; the term is used in Hindu mythology to denote the earthly form adopted by a deity, commonly Viṣṇu. In MUVEs, 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. In addition, they are able to communicate with large groups of avatars (via voice- or text-chat or asynchronously with podcasting or 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.

The diversity of educational contexts enabled by MUVEs accommodate a range of learning styles. Fleming identified four types of learning styles: (a) visual; (b) auditory; (c) reading/writing; and (d) kinaesthetic, tactile, or exploratory, resulting in the acronym VARK (Fleming & Baume, 2006, p, 6). 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 active learning, in alignment with those trends identified by Bonk, Kim, and Zeng (Bonk & Zhang, 2006, p. 251). This in part could be achieved in MUVEs 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).

Problems with Learning Design and aspects of MUVEs

At this time, there is no way to package a MUVE so that it can be embedded into a LD for ready use in another environment due largely to the fact that they exist on external servers which are able to be accessed by an unlimited number of users at any given time. Instead, in order for the MUVE 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).

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. 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, as implied by the conformation to IMS LD standards, would protect the substantial investment necessary for the development of an ALE (by allowing reuse and adaptation); should allow for interoperability in different environments; and the possibility for aggregation of content by subsequent users (Paramythis & Loidl-Reisinger, 2004, pp. 181-182).

The use of MUVEs as an educational setting is not new, yet there is scant literature addressing the topic of IMS LD and MUVEs or even Massively Multi-player Online Role-playing Games (MMORPGs). The literature relating to IMS LD yields some discussion of problems associated with and relevant to MUVEs because of the favoured instructional methods in these environments; specifically collaborative and adaptive activities. In addition, I have attempted to isolate and identify those issues more especially associated with using IMS LD with MUVEs.

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

Previous e-learning standards have only supported the use of a single learner (e.g. SCORM) and it is here that IMS LD offers a considerable advantage, offering the integration of discussions and more complex collaborative approaches. Even so, there are a number of problems trying to describe collaboration using IMS LD. Obviously, there are often significant timing issues associated with collaboration, particularly in a MUVE. For example, one piece of a task to be undertaken by one learner may not be able to take place until another part of the task is

completed by another learner; timing is crucial. Caeiro-Rodriguez, Llamas-Nistal and Anido-Rifón identified three types of timing issues associated with collaborative learning. These are:

1. Synchronisation 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. deadlines), most are not, significantly hindering the expression and subsequent management of collaborative activities (Caeiro-Rodriguez et al., 2005, p. 12). In addition, 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. Even though the distribution of learners into groups is expressly supported, as is the ability for students to take on the same roles at different times (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 or other environment can be adequately described. Given the nature of the sorts of activities taking place in MUVEs, this is entirely restrictive (Hernández Leo et al., 2004, p. 350). At the moment, 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. 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 type of awareness information needed and provided by the service, floor control policy that guides learners' actions, communication skills required to 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 there has not been another version.

Beyond the difficulties associated with collaboration and IMS LD in MUVEs, the inability of IMS LDs to be altered while they are running is a significant issue. It is sometimes necessary for students to edit the learning activities as problems arise which necessitate a change in the design of the activity. This would be a common enough problem in a MUVE where constructionist learning is paramount, and where students are encouraged to use their prior experiences, collaborate with peers and to adapt to changing 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).

An IMS LD is proscriptive and it is not possible to alter 'on the fly' using Reload with Coppercore. MUVEs are 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 favoured by educators and there is a strong sense of community among them. It is possible (and even likely) that if another educator heard about a novel assessment piece or learning activity, they might come by and have a look. These chance meetings are excellent opportunities to augment the experience and would be encouraged under normal circumstances. Another avatar from outside the original grouping may be a content expert. The educational activity would be enhanced by that person's contribution (via their avatar). This would lead to a redesign of the original learning activity. At this time, this is not possible in IMS LD (Berggren et al., 2005, p. 7). A Learning Management System (LMS) such as Moodle, enables activities to be adapted on the fly. One possible way of overcoming the proscriptive nature of IMS LD would be to use an IMS LD compliant authoring tool within Moodle that would enable the export of a later iteration of a LD, while stripping user data (Berggren et al., 2005, pp. 8, 12).

Problems with IMS LD Specific to MUVEs

Very little has been done in regard to MUVEs and IMS LD. There has been some work done on IMS LD and generic games and it is to this literature that I turn. Video games 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, 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 or activities within a MUVE, provide an efficient means 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 (see 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 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 LMS (such as Blackboard or Moodle), could involve a student or group of students formulating a detailed business plan (in the form of a wiki) in order to run a business making clothes for sale in 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.

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 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). This would have the advantage of being able to completely control the flow of the UoL and the MUVE 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 SLeD (Service-based Learning Design) player which functions as the front end for a CopperCore Run-Time (CCRT) environment. The CopperCore Service Integration (CCSI) layer allows the integration of different services, such as forums or assessments, in the CopperCore environment (Moreno-Ger et al., 2007, pp. 257-258). Neither 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 is 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) 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, e.g., results of an assessment or game can be utilised to determine the further course of a learning sequence (Payr, 2005, pp. 210-211).

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 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 and through some sort of adaptive release, can determine subsequent activities.

Developers of Blackboard are similarly striving to create some interactivity between Second Life and their own LMS. A $USD25 000 grant was recently 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's 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

In this paper I have attempted to introduce the topics of IMS LD and MUVEs, specifically Second Life. Though there is not a literature dealing specifically with this topic, I have identified those issues that may be more often encountered in MUVEs, specifically those associated with IMS LD and collaboration and also adjusting IMS LD on the fly. I have briefly discussed the possible resolution of these issues through the addition of a service, specifically 'groupservice', even though it is unlikely to address all of the issues raised.

I went on to investigate those issues that relate more closely to MUVEs, 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 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.

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