

Using the ADDIE Model to Design Second Life Activities for Online Learners

By Shiang-Kwei Wang and Hui-Yin Hsu

“Educators should explore the possibilities of engaging and improving online learners’ motivation, thereby increasing the likelihood of achieving desirable learning outcomes.”

Second Life (SL) (<http://www.secondlife.com>), a 3D multi-user virtual environment (MUVE), is developed and maintained by its users. Over six million users from over 100 countries have become residents in SL (Pence, 2007). Non-profit and profit organizations and academic institutions have built islands, established a presence there, and explored the related benefits to their target users.

Educators and students who are not familiar with the virtual learning environment should have an opportunity to learn about the rationale of using SL in teaching and learning. This paper summarizes the merits of adopting SL in teaching and learning, issues of SL use, and the use of the instructional-design principle relative to the design of SL learning activities.

Why Use Second Life?

With the advancement of computer and network technology, more and more universities have been adopting an online campus mode to offer courses to students. Usually, students participate in the courses by means of a course management system such as Blackboard. With the course management system, students who reside far from the campus can interact with instructors and peers and can submit work to instructors for their review online, all asynchronously. To help increase students’ social presence, some instructors adopt synchronous communication tools in their online teaching: for

example, the VoIP (Skype) tool (Pan & Sullivan, 2005), the instant messenger tool (e.g., MSN, Yahoo! Messenger) (Wang, 2007), or the webinar tool (Elluminate) (Wang & Hsu, in press). However, studies have uncovered several unresolved problems herein, namely, online learners’ completion rate is lower than traditional face-to-face learners’ (Diaz, 2002; Keith, 2006), and online learners are less satisfied with the method of online delivery than face-to-face learners are with the method of face-to-face delivery (Summers, Waigandt, & Whittaker, 2005). With computer technology and Internet applications that are more and more advanced, educators should explore the possibilities of engaging and improving online learners’ motivation, thereby increasing the likelihood of achieving desirable learning outcomes (Dweck, 1986; Wu & Hiltz, 2004). The following section discusses the rationale for integrating SL into online learning environments. To help readers visualize these examples and the contexts, the authors of the current study captured SL video clips and disseminated the video clips through the web page <http://secondlifeforme.blogspot.com>.

Enriched learning experience

SL provides a near-real life environment and gives users access to objects or phenomena impossible to observe or examine in real life. For example, the International Spaceflight Museum designed a series of simulation modules enabling users to play with scientific objects

such as a lunar landing and a solar system; the National Oceanic and Atmospheric Administration built the Earth System Research Laboratory featuring a simulator with which users could experience tsunami waves and observe the process of glacier retreat. Users can visit a mystic world or an unfamiliar culture by means of, for example, the Maya Culture Explorer Center. Some organizations replicate real-world events in SL for users who cannot visit the events in person. For example, Sony-Ericson hosted a virtual exhibit that was similar to the firm's real exhibit at the 2008 Barcelona Mobile World Congress. In brief, instructors can organize SL virtual trips for their students to explore and experience phenomena of interest.

Strengthening a sense of social presence

"Social presence" refers to the "sense of being together with someone" (Short, Williams, & Christie, 1976). Social presence has been an important element in the online learning environment because the sense of this presence has usually been missing or weak in the asynchronous learning environment in comparison to the face-to-face learning environment (Garrison, Cleveland-Innes, & Fung, 2004; Ocker & Yaverbaum, 1999). Building a strong sense of community to connect online learners has become an important issue for online educators (Hill & Raven, 2000; Lally & Barrett, 1999).

In SL, users interact with each other through a virtual agent—an avatar. An avatar is an identity that is customized by the user. Users can create an avatar that is similar to or totally different from their own appearance; indeed, a user's avatar could be an imagined alien or a fairy-tale rabbit. Jung (2008) conducted a study on this matter, and the results reveal that social presence has a direct relationship with users' intention to participate in the SL online community. Pence (2007) pointed out that students in SL feel a strong attachment to their avatars. Users establish their social presence by interacting with one another, and interactions between avatars give SL great potential to strengthen online learners' sense of community. For a class mediated in an online environment, the instructor could consider meeting with all students several times in SL to help them sense the social presence of all participants in this class.

Multi-level interaction

Interactions that occur in a web-based learning environment can fall into one of three categories: (1) relationships between students and content, (2) relationships between instructors and students, and (3) relationships among students (Moore, 1989; Northrup & Rasmussen, 2000). In

an asynchronous learning environment conducted through a course management system, users have greater flexibility to manage learning pace and have more time to reflect on the learning content and respond to others (Meyer, 2003). Synchronous communication tools do not easily replace the first type of interaction because learners need considerable time to digest and to reflect on the content. Moreover, the document management feature in SL is poor (Kemp & Livingstone, 2006), making it difficult for instructors to organize learning materials and manage individual learning progress. Nonetheless the focus of this paper is not how students can build objects in SL but how faculty can use SL as a tool to supplement subject learning. In this case, SL can better support and enrich the last two types of social interactions because participants in SL can interact with each other through its synchronous communication tools (text chat and voice chat), where personalized avatars represent participants as though they are present in the learning environment.

Social interaction occurs through both verbal and non-verbal forms in SL (Robbins, 2007). The verbal and non-verbal forms of interaction are the forms that characterize people's real-life communication, which rests on speech, writing, and body language. In this sense, nonverbal forms include the avatars' posturing, appearance, movement, proximity to other avatars, and sound effects; the verbal forms include both text chat and voice chat. Here is a specific example of an online class conducted through the SL environment.

We, the authors, arranged a SL meeting with the online class and decided to make an impromptu visit to a library. As soon as we (acting as visitors) arrived at the library, the attendant at the front desk immediately asked us to state the purpose of our visit. After receiving all the information that he needed, the attendant permitted the visit but kept an eye on us and hovered around until the meeting was over. We then took the group visit in the library and observed whether or not every student was following and completing the assigned group activity. In a virtual world, most users treat each other as they would in the real world and expect others to follow real-life social rules and regulations. Therefore, body language plays an important role in SL and sends signals to instructors so that they can know if students are paying attention to the class materials, are getting distracted from learning content, or are lagging behind the learning progress.

In a course management system, the interaction is limited to a closed environment,

meaning that students interact with only the instructor and their peers. In contrast, the SL participants have opportunities to meet with users from all over the world. This open environment feature enables instructors to promote collaboration

among students enrolled either in different classes or even on different campuses and to present remote keynote speakers' virtual presentations to students.

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Promoting constructivism

A fundamental constructivist belief is that learners construct knowledge through their own prior knowledge and unique personal experiences of the world. Thus, educators should provide a learning environment that allows users to explore and construct their own meaning. Dalgarno (2001) summarized three broad principles to define the constructivist view of learning:

1. Each person forms their own representation of knowledge.
2. Learning occurs when the learner's exploration uncovers an inconsistency between their current knowledge representation and their experience.
3. Learning occurs within a social context, and interaction between learners and their peers is a necessary part of the learning process (p. 184).

These three principles can be supported and mediated by SL. In SL, each learner has the freedom to discover information relevant to his or her interests and to explore knowledge from the web through the “teleport” feature and the “hyperlink” feature. SL provides manifold simulators that allow users to experiment and observe the immediate responses and the simulation results derived from different combinations of parameters. With the instructor's facilitation, learners could be presented with a problem and be encouraged to discover the inconsistency between their current knowledge and their experience in the SL environment. In a 3D virtual environment, learners have to become active participants rather than passive observers. Learners' curiosity is aroused through the learners' interaction with the simulators (e.g., observation of glacial retreat). The multiple forms of information provided (e.g., related web sites, pictures, videos, other resources) encourage users to learn the topic in depth. The

embedded communication tools (voice chat, text chat) facilitate learner-to-learner social interaction, which allows instructor and group members to immediately help learners complete a given task individually or collaboratively.

In addition, Jonassen, Davidson, Collins, Campbell, & Haag (1995) pointed out, “Constructivism can provide theoretical bases for... computer-mediated communication” (p. 20). SL can support computer-mediated communication and facilitate the exchange of social experiences. The SL environment closely resembles the real world, thus allowing SL instructors to design authentic tasks whereby learners can explore the world, solve problems, construct and negotiate meaning, and collaborate with other learners.

Enriched multimedia resources

In addition to text, images, and 3D objects, SL supports the playback of audio and video files, enables two-way voice chat, and connects with hyperlinked materials on the web. Users can capture 2D-image SL snapshots or record video clips to document activities and interactions. The legitimate members of an island can create and build 3D models and can design interaction through the SL programming scripts.

Challenges of Using Second Life

Despite the many advantages of an ideal virtual learning environment, several challenges merit attention regarding use of SL in class. SL has high-end hardware requirements. Users might need to upgrade their computer equipment in order to smoothly run SL without delayed speed or rough graphic effects. Many organizations and schools block use of SL because it occupies the network bandwidth. Therefore, students would have to use their home computers to log on to SL.

Unlike learning in a face-to-face class or through the course-management system, the SL session is an open environment where anyone can drop in anytime, anywhere if the instructor does not have the authority to lock the SL campus. People with ill intentions might interrupt the class by entering the meeting site, by observing the classroom, or by distracting students (e.g., through use of private text messages).

If the class is communicating mainly through the text message feature in SL, the text can become tangled and it is difficult for the instructors to follow the conversation. The number of participants should not exceed the instructors' ability to give individual attention; large numbers weaken the conduct of group activities and the interactions among individual participants.

The asynchronous communication tools provide a better approach to facilitating a given structured and mandated discussion (Johnson, 2006). Instructors could remind learners of all these challenges at the start of class. We suggest that instructors adopt voice-chat tools rather than use text chat as the communication tool, and we suggest that learners be required to prepare necessary equipment (i.e., headsets and microphones) in advance. We suggest also that, if instructors cannot access a private meeting room, they should conduct a group discussion at a site like “Place to Meet” island (<http://www.secondlife.crowne-plaza.com>). It provides three conference rooms in which users can hold private meetings and use multimedia resources.

Using Instructional Design Principles to Amplify SL Learning

To help instructors design and deliver an effective lesson at SL, the second part of this paper discusses the process of applying instructional design principles to the creation of SL learning activities, and how these activities reflect the abovementioned SL capabilities. Moving students from a face-to-face environment to SL does not guarantee better learning outcomes. Online educators must understand the pros and cons of a new tool, then investigate how the new tool can meet the instructional needs. The instructional design principles constitute a systematic method that helps educators design learning activities consistent with learning objectives and evaluate learning outcomes.

From many instructional design models, we chose to apply ADDIE (Analysis, Design, Development, Implementation, and Evaluation) (Peterson, 2003), a generic and simplified instructional systems design model, to the AECT’s (Association for Educational Communications and Technology) learning standards. We adopted ADDIE to ensure that instructors’ implementation of this learning activity would effectively help improve learners’ knowledge and skills relative to learners’ use of a virtual 3D learning environment. Our adoption of ADDIE rested also on our effort to ensure that learners would have effective, meaningful applications in their professional fields. We selected SL as the virtual 3D learning environment to facilitate the learning activity. This class took place in an instructional technology graduate program at a four-year university in New York and focused on the trainers’ preparation. Most of the twelve participants were part-time students, trainers, or trainers-to-be; therefore, online learning provided them a more flexible way to partici-

pate in class. Although the class was delivered through a course management system (Blackboard) for three months, the instructor used SL to meet with the students for several sessions to give them a stronger sense of the online learning community. The other reason we adopted SL was two-fold: the presence of many businesses and other organizations on SL, and trainer students’ expressed interest in learning to use SL to benefit their organizations. Therefore, the learning objectives of the SL sessions were for instructional technology students to 1) know basic SL operations, 2) understand the pros and cons of using SL in teaching and learning, and 3) know about exemplifying cases of SL use in K-12 settings, higher education, and corporations. None of the students had used SL before they enrolled in the class.

Analysis: The instructor should conduct a needs analysis relative to the target learners. It should include an assessment of the content of learners’ knowledge, what they want to learn, and why they need to learn it. In addition, the analysis should include their learning characteristics, motivation, technology affordance, and learning goals.

In the first week of class, the students completed an online survey consisting of a list of questions pertaining to their experience with using SL. The completed survey helped the instructor determine the students’ background knowledge and learning motivation.

Design: In the design phase, the instructor should determine learning objectives and design learning strategies, learning activities, assessments, and methods to organize and present the content on the basis of learning objectives.

In this case, because none of the students had used SL before, the instructor had to design a series of sequenced activities that would 1) help familiarize the learners with SL operations, 2) support collaboration and negotiation through SL’s multi-level interaction, and 3) support learners’ active participation in SL, thereby supporting the construction of the learners’ knowledge and experience regarding how SL can optimize online teaching and learning. The following are activities we designed and the assessment we adopted to ensure realization of the learning objectives.

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Activity 1 (warm-up): Students were instructed to create an SL account, edit their own avatars’ appearance, and add their peers to the “friends list.” By following these steps, users could use the “teleport” feature to relocate and to put back on track any friend who got lost or trapped in SL. Then, the directions showed students the way to Orientation Island Public, an introductory entry point where they could

practice basic SL operations. An assignment required the students to take a snapshot of themselves playing ball on the island and post the pictures on Blackboard. Proper completion of this assignment would prove that the student had mastered the basic SL operations.

Activity 2 (readings): Students reviewed the assigned SL papers and presentation slides on the use of SL in teaching and learning. They were required to respond to questions

posted by the instructor on Blackboard. The students exchanged their thoughts with one another to demonstrate their understanding of SL’s possible applications in both teaching and learning.

Activity 3 (exploration): Students used the teleport function to visit several designated landmarks and, once there, to explore how non-profit museums and schools were using SL and to explore, especially, those organizations’ applications of SL in the trainers’ own fields. Using Blackboard, they were required to share

with one another a good idea regarding SL use in their area of expertise and to post the SLURL of a landmark that they could adopt in their organizations.

Activity 4 (group interaction): The entire class met with the instructor in SL for two sessions and visited islands that could facilitate teaching and learning. The instructor led the group discussion, observed each avatar’s participation and reaction, and facilitated the interaction among group members.

Activity 5 (reflection): Students wrote a 2,000-word paper to discuss the pros, cons, concepts, and potential of using SL in teaching and learning, following the rubric created by the instructor.

Development: In the development phase, the instructor was to construct and deliver materials required for the sessions.

Because the class was conducted in online sessions, the instructor constructed a web page to help deliver all activities and to list deadlines corresponding to the assignments on Blackboard. With the hyperlink features, the instructor could list the SLURL of a particular location in SL so that students could access that location. The instructor scrutinized the SL islands to make sure that all activities were designed well and to measure the time students might spend on each activity, and then allotted students one month during which they could complete the five activities and all assessments. The instructor used the snapshot and video recording features to set up visual examples and to post these images and videos on the web page for students’ benefit.

Implementation: Implementation concerns the actual launching of the course. Students followed the directions on the web page to complete organized activities and to share their reflections on and experiences of Blackboard. Each activity was designed to build students’ confidence in using SL and guide their exploration of SL use in teaching and learning. SL’s potential to support multi-level interaction, multimedia resources, and social presence enabled us, while in the 3D virtual environment, to engage in dynamic communication with one another through text, voice chat, and avatar body language. The whole class met in SL, which provided the participants many opportunities to meet with one another and to strengthen the sense of community (see Figure 1). Students demonstrated enthusiasm for the use of the tool and were excited about meeting in SL, even in the second session. After we completed the two required SL sessions, students requested that the instructor conduct more SL sessions even though this scenario would require that students arrange time to meet synchronously.



Figure 1: A screen shot of the synchronous class meeting, which took place in a conference room with the instructor.

Evaluation: The evaluation helped the instructor determine whether the curriculum was successful and how it could be improved for the next implementation phase. The evaluation included formative and summative evaluations. The evaluator should conduct the former in each ADDIE phase to determine the effectiveness and the quality of each phase; the evaluator should conduct the latter to determine the effect of the curriculum on learners' performance and on learners' satisfaction with the curriculum.

A faculty member was invited to participate in the SL activity as an external evaluator observing the implementation of the SL learning module. She provided suggestions and opinions through her observation of the SL sessions. We collected participants' interaction in SL, feedback, questions, emails, and responses to the assignments and used these data as the sources of formative evaluation. Participants' SL reports constituted the source of the summative evaluation. According to the summative evaluation data, about three-fourths of the participants had learning outcomes that matched the learning goals. The students were satisfied with the "near face-to-face" opportunity that SL provided them to meet with the instructor and classmates online. All students were willing to allocate time for SL-based class sessions even though attendance at the sessions was not required. Some of them had the "pre-SL use" impression that SL was a game that might distract learners. However, after exploring SL and coming up with applications of SL to teaching and learning, the learners pointed out that, if used with the appropriate pedagogies, SL is a tool that can create or strengthen the abovementioned advantages.

The full version of the SL lesson plans, the associated SLURL of each island, and the SL resources for educators are available on the following web page: <http://secondlifeforme.blogspot.com>.

Conclusion

Technology is a tool that people can use to meet instructional needs; in many other instances, technology creates counterproductive distractions or fails to improve learning outcomes.

Online learning instructors should consider the pros and cons of using SL and what it can do to help engage online learners, and then should design tasks that motivate students to participate in SL. Nevertheless, the instructors should avoid "throwing" learners into the SL environment without first giving them specific instructions or meaningful tasks. Learners should at least have opportunities to familiarize themselves with the SL operations before trying to accomplish complicated assignments. Without specific instructions, students might become frustrated with trying to navigate SL, much less with trying to complete the learning tasks. In this case, ADDIE constituted a systematic method that helped the instructor design learning tasks that would take place in an SL virtual environment and that would ensure SL's function as a tool assisting teaching and learning.

To strengthen students' SL-learning experience, the instructor should 1) explore SL first to realize what an SL user can do in the virtual environment, 2) explore how SL activities can relate to the course topic, and 3) then introduce these SL activities to the students. The implementation, if it is to be successful, should rest on both a carefully designed blueprint and pre-testing by instructors.

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