INSTRUCTIONAL SYSTEMS DESIGN (ISD):
Theory and Practice in Second Life

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ABSTRACT

The considerable changes in distance learning related technologies and Web 2.0 tools direct new immersive platforms to serve on the concept of avatar-driven interactions. In this sense, the immersive learning platforms, like Second Life (SL), embrace innovative forms of network based settings for effective community interactions. SL, as an interactive learning milieu, conducts 3D interactions and active education within the context of Instructional Systems Design (ISD) which makes learning experiences efficient for both the tutor and learners on the platform designed on social networking. The platform gives an appropriate service to its users to be part of an instructional application of virtual worlds in where learners become connected though online activities. Within the learning theories existing nowadays, instructional designers, who are working in 3D environment like SL, are using mainly cognitive theory and constructivist strategy of learning. According to cognitive learning theory, people learn in different ways that are individually contextual and new trends in Instructional Design (ID) had to address these differences. There are number of already approbated instructional models, which are used widely in the process of creation learning courses for 3D environments. The most frequently used model is ADDIE (Assess–Design–Develop–Implement– Evaluate), and the model PIE (Plan-Integrate–Evaluate), that is relatively new and become increasingly popular as it allows easy integration of technology in the classroom-oriented (virtual or real) teaching. Based on the above mentioned concerns, this paper will examine the instructional design models used to create immersive courses within SL. Further, the paper will collect ideas on the instructional tools and technologies used for designing SL courses as these new technologies used in this environment draws heavily on andragogy.

The paper will also clarify the obstacles on virtual learning through SL and make suggestions for the active immersive learning within the context of Distance Education.

Keywords: Second Life (SL); avatar-driven interaction; Instructional Systems Design (ISD); immersive learning platforms; 3D; instructional models, cognitive theory; ADDIE; PIE
INTRODUCTION

The rapid change in ICT technologies currently elicit new virtual platforms designed on the concept of online humanized avatar interactions. In this context, new incentive distance learning platforms, like Second Life (SL), embrace innovative forms of networked interactions for diversified population of learners across the globe. As indicated by Holmberg (1990; Sadik 2006), interactive learning milieu is the most crucial criterion for conducting interaction between the tutor and students. According to his point of view, milieus designed onto distance education technologies that gather elearners for interactive discussion should be taken into great consideration. As connoted by Wilhelm (1994), computer-generated environments - like SL - could be advantageous to researchers when things cost too much; cannot be produced in reality, or takes too long to manufacture. With a similar approach to Wilhelm (1994), Wright (2008) agrees that SL is a virtual world without theme, a virtual canvas for creativity, not inherently based in mock war such as video games. Therefore, the milieu can be respected as a multi-user virtual space in where all types of human interaction can safely be tried out.

In writers’ description, SL is a 3D application, which allows its users to create unique designs and interact within an immersive milieu through self-created visual representatives called avatars. With all these reasons, Wright believes that elearners would most gladly make the scheduled time for the virtual classroom because of being involved in a highly interactive avatar-based virtual world education where there is high interaction. However, above all, there is still a big need for analyzing interactions within the context of Instructional Systems Design (ISD) which makes online learning experiences efficient for both the tutor and learners on social networking platform called Second Life.

REVIEW of LITERATURE

3D Virtual Worlds have enormous potential in education. They create new opportunities in enhancing experience and transferring of learning. The immersive learning platforms, like Second Life, have opened new horizons in teaching and learning, converting the process of education into the interesting and exciting game. Second Life is one of many virtual world products on the web that allows a user to assume an avatar persona and socially interact with other people in a virtual world. On October 24th, 2009, 9:40 am eastern standard time, there were 52 thousand people logged into SL. In the average, every two month 1,222,789 people are logging into the SL. In addition to SL there are currently 150 virtual worlds online today and by 2012 that is expected to grow to 900 (Mithman, 2009).

The concept of the SL is based on the consideration, that it is much easier and convenient for users to switch to and forth first (real) and the second (virtual) lives, when both of them are 3D. Learners in SL are not only passive observers of the processes that are going on the monitors of their computers, instead, they can participate actively in every event they see, influence and change the logic of these events’ development, move to different activities at their discretion and so on.

As highlighted by Far Link (A Second Life avatar character), SL is a collaborative, entertaining, challenging and social tool for simulating and testing real world interactions (Willis, 2008). The immersive land of SL allow elearners or their surrogate avatar persona (de Byl and Taylor, 2007) to work collaboratively in a constructive learning milieu within individual or group forms of activities.
As connoted by the same authors:

**Immersive 3D environments provide distance students with**

- **interactivity with content and processes enhanced by simulations and role plays** (Oblinger, 2004; de Byl and Taylor, 2007);
- **opportunities to be interactive with individuals or groups of individuals**
- **while immersed within another activity** (Rosenbloom, 2004; de Byl and Taylor, 2007); and
- **the capacity for students to build their own activity and experiences**; to
  - **take control of their own learning** (Meiguins et al., 2004; de Byl and Taylor, 2007).

The three dimensional virtual SL world, entirely built and owned by its avatar-residents has become a trend with the Web 2.0 electronic social approach (Hargis, 2008, p.2). On this immersive world, avatars can fly, teleport, record their experiences, and cover the globe beyond traditional space-time barriers. The term avatar has been used when referring to many different ways of representing networked users graphically (Cassell and Vilhjalmsson, 1999, p.46). The avatars create a learning community by collaboration, participation, interaction, and communication (Lock, 2002; Bronack, et. al. 2008) by synchronous/asynchronous communication such as instant messaging (IM) and text chat. Language barriers are almost overcome with automatic translations in text chat mode. One such classroom can be seen in Figure: 1.

![Figure 1: Virtual World Learning Environment (Second Life, 2010)](image)

Bronack mentions that **this was particularly an evident between students who quickly mastered how to function in SL, compared to those who did not and this discrepancy’s impact on the experience for both groups** (Bronack et al. 2008, p.61). The same author discusses this notion of “Presence Pedagogy (P2), an emerging framework of teaching and learning grounded in the praxis of social constructivist theory and 3D immersive learning environments” (Howard, Sanders & McClannon 2010, p. 40) that is the presence of instructors and students, as a critical element in virtual world learning environments. Instructors and students who are engaged in a P2 learning environment can take part in a broad community of practice in which each participant becomes an active learner. Thus, learner-participants of this community learn in both individual and group tasks. However, in this case, the presence of other class members did not necessarily create the right environment conducive to experiential learning, due to lack of skills and abilities of the participants.
The findings also suggest that it should not be assumed that all students use the new technology in the same way (Hargittai, 2007).

Identity barriers experienced by self-conscious participants are eliminated by the inherent protection of the Avatar facade. The elimination of so many barriers enhances the learner's engagement and subsequent assimilation of new material (McPheeters, 2009). All learning styles (Baird & Fisher, 2005) whether visual, spatial, kinetic, or auditory are accommodated easily. Likewise, people with different learning styles -also labeled multiple intelligences (Moran, Kornhaber & Gardner, 2006)- will find learning opportunities through the increased variety of virtual non-formal learning activities inside SL and its counterparts.

The time for systemic changes in education has come. Educators must update and retool their thinking and practices to meet the demand of a virtually connected world. The 3D virtual environment has torn down barriers of time, distance, and human possibilities. Second Life, as an immersive learning platform, offers a well suited model to develop constructivist learning experiences shared within a globally multi-cultural environment. Learners within virtual learning environments such as SL discover creative possibilities previously unavailable in either F2F classroom or the traditional distance learning classroom. Genuine social presence is created in the virtual learning environment. In many aspects, SL classroom is quite close to the F2F classroom, but it gets yet with many advantages that are not available in real life.

![Figure: 2 Immersive Learning Platform of SL (Second Life, 2010)](image)

SL offers a highly interactive, web-based lessons delivery platform. This immersive learning platform makes an effective learning process that is aimed to support learners in gaining as much knowledge as possible, taking into account cognitive possibility of each learner. Within this interactive learning milieu, learners are expected to generate connections easily between what they already know and the new information they sort out from the new experience. Wittrock (1989) terms this process generative learning. Lebow (1994) linked this generative process to constructivist principles. While clarifying ISDs and its effects on e-Learners, the dimensions of online learning should be taken into great consideration. Unquestionably, learners’ promotive interaction is a crucial factor for effective online learning.
As it is recently debated by Cargill-Kipar (2009), promotive interaction emerges when individuals encourage and facilitate each other’s efforts to reach the common goal of learning. As the writer highlights, the interaction occurs when there is an effective communication and an exchange of needed resources between tutors and students in order to complete tasks in an online classroom like in SL’s. Hew and Cheung (2008; Bailey & Moar, 2001; Dickey, 2005b; Peterson, 2006) underline the limited data source relevant to promotive social interaction in virtual worlds.

In research questions, researchers mainly focused on communicative features of the user avatars within the frame of socialization and interaction; however, only a few descriptive studies covered this research topic. Thus, SL media could be explored in a wider scope of virtual learning.

SL as a potential social networking space may have a reflection of an academic life with real results of teaching. Therefore, it requires a close observation. To Wood (2009, p.140), even though SL is not constructed as virtual games, it provides a space in which virtual communities have been established by the residents as role-playing game environments. To Warburton (2009, p.419), social acts and socialization drive the use of SL and are supported by multiple communication channels, viewable avatar profiles and the intricately built architecture and objects.

![The Educational Environment of SL (Second Life, 2010)](image)

The educational content of SL designed onto learning and communication would make the curriculum based on adult-avatar centered interaction. As the main population in SL are adults, the instructional tools and techniques used in this environment draws heavily on andragogy. In practical terms, andragogy means that instruction for adults needs to focus more on the process and less on the content being taught. Therefore, instructional tools like case studies, role playing, simulations, and self-evaluation are extremely useful. The role of instructors is changed dramatically:

They adopt a role of facilitator or a resource, rather than lecturer or grader. For adults, it is very important to know why they are learning something, what is the practical outcome of what they are learning.

Consequently, they prefer to learn experientially and use problem-solving approach to learning. The interactive learning milieu of SL provides great opportunities to achieve this goal: Create the user-friendly learning environment, equally useful for learners with different mental, psychological, cultural and cognitive possibilities.
SL is a social platform designed onto interactive conversation and a provider for social learning network; however, social interactions should be supported by emails and face-to-face discussions (Goksel-Canbek, 2009).

The platform gives an appropriate service to its users in order to be involved in an active education.

The course content can be configured in compliance with andragogical principals and be supported by technological tools. With the interactive-communicative structure, SL can gather tutors and students in one immersive unity. Having active education and achieving the common goal in online learning, tutors and students interaction should not be considered as a deniable fact. With an active interaction, tutors and students can engender a joint source which also serves to communities. Learners with other learners can interact in a social network on where they can evolve their technology literacy. By making the learning environments as platforms based on social interactions, one-way instruction can be eliminated.

INSTRUCTIONAL DESIGN MODELS

Within the learning theories existing nowadays, instructional designers who are working in 3D environment are using mainly cognitive theory and constructivist strategies of learning. According to cognitive learning theory, people learn in different ways that are individually contextual. Therefore, new trend in ID had to address these differences. Specialists argue that strategies that promote collaboration and social negotiation, multiple perspectives, exploration and self-directed learning provide the strongest support for constructivist learning.

Among the instructional design models used to create learning courses within 3D environment the most popular are:

- ADDIE (Assess–Design–Develop–Implement–Evaluate): This model is considered as most useful and successful model to use in the process of instructional design. Despite the fact that ADDIE model is one of the first ID models, it is still most widespread used model due to its simplicity and clearness.
- ASSURE (Analyze learners -State objectives- Select instructional methods -Utilize media–Require learner participation- Evaluate and revise)
- Algo-Heuristic: This theory suggests all cognitive activities can be analyzed into operations of an algorithmic (measure of complexity), semi-algorithmic, heuristic (computational method), or semi-heuristic nature;
- Dick and Carey Model: According to this theory, instruction should be break down into the smaller components. This model is most useful when teach skills and knowledge;
- PIE (Plan–Implement–Evaluate): The relatively new model, which allows easy integration of technology in the classroom-oriented teaching. This model was created by Tim Newby, Don Stepich, Jim Lehman & Jim Russel. PIE model was used to develop a virtual classroom in the Sloodle Island in the SL (McPheeters, 2009).

The ID models listed above are used to create learning courses that support cooperation and collaboration of learners. Collaboration and cooperation between learners is in the core of the cognitive approach to learning.
According to Bruner’s (1966) constructivist theory, learning is an active process in which learners construct new ideas or concepts based upon their current and past knowledge.

The main concept of this theory is that instructors must encourage learners to discover new knowledge themselves, based on their prior knowledge. Teachers and trainers are taking the role of interpreters of the new material to the learners into the most convenient for their format, in order to lead them to new discoveries. Learners should be free to make their own decisions and hypotheses, discuss and argue about learning topics, explain to each other if something is not quite clear, and come to final decision themselves.

**COGNITIVE PROCESSES in SL**

An immersive learning platform of SL satisfies all these requirements. Learners in SL, represented with avatars, are forming learning groups made up from high, average and low achievers, racially and sexually mixed, which are aimed to master particular academic material.

**Figure: 4**

Learners represented with avatars in SL (Second Life, 2010)

Within this environment it is much easier to accomplish nine instructional events and corresponding cognitive processes, outlined by Gagné (1965):

- **Gain attention:** Thanks to immersive graphic environment of SL, this provides fruitful field for gaining learners’ attention. Avatars and 3D environment enable learners to become actual participators of actions and simulations that are going on in the learning process. This sense of presence is one of the most powerful motivations that force people to be engaged in learning.
- **Informing learners of the objectives:** SL islands are full of different colorful advertisement banners that, in fact, are very effective instructional tools in learning.
It is one of the Wittiest usages of advertisement banners in the learning process. Avatars, motivated with curiosity, will never pass by these banners, and they will always keep in track of the learning objectives this way.

- Stimulating recall of prior learning: SL islands are rich with different kind of quizzes. Some of them are for grading and some of them are for recalling already covered material. In general, repetitions are of key importance in learning. This scheduled instructional tool should not only let a learner to refresh his or her knowledge, but also to link it to the new learning. 3D environment of SL provides bondless opportunities to plan repetitions in creative way: through simulations and branched virtual quizzes learners can check if they remember and are able to connect previous material to new learning.

- Presenting the stimulus: One of the challenges of modern learning environment is a need to provide formal instruction in information, visual, and technological literacy as well as how to create meaningful content with today’s tools (New Media Consortium’s Horizon Report, 2008, p.3). Learning stimulus are formal instructions, which are one of the necessary components of the successful learning process. Consequently, it is vital if these instructions are represented to learners in meaningful and easy to understand way. The immersive world of SL provides number of different tools of presenting the learning stimulus in the most convenient and attractive way.

The game-based milieu of SL lets learners to achieve as much as possible, regardless their cognitive possibilities, as it is required by the modern learning methodologies. One of the effective ways to stimulate learners to participate in learning process more actively is possibility of creating real world like simulations.

Simulations in SL enable learners not only to see how a particular place looks like or how a particular event is going on, but also be the part of this simulation. Wide varieties of different islands available in SL represent skillful simulations, which are very close to real life. Learners can enter these islands by means of their avatars and become a real part of this imaginary world.

- Providing learning guidance is of key importance in learning process. Part of the scientists insists that learners learn best in an unguided or minimally guided environment, rather than being presented with all the necessary information. In this case they must discover or construct essential information for themselves. But, on the other hand, according to other theorists (e.g. Cronbach & Snow, 1977; Klahr & Nigam, 2004; Mayer, 2004; Shulman & Keisler, 1966; Sweller, 2003) learners, especially novice learners should be provided with direct instructional guidance on the concepts and procedures required by a particular discipline and should not be left to discover those procedures by themselves.

- Direct instructional guidance is defined as providing information that fully explains the concepts and procedures that students are required to learn as well as learning strategy support that is compatible with human cognitive architecture. As highlighted by Kirschner, Sweller and Clark (2006), learning, in turn, is defined as a change in long-term memory. Therefore, learning guidance should lead to changes in learners’ long-term memory.
Immersive virtual environment of SL provides a lot of different tools to create very helpful learning guidance to the learners, starting from different interactive elements of SL environment, ending with the precise instructions to follow.

As indicated by Clark (2009), a case of Genome Island, which is located in SL, can be given as a good example for providing learning guidance. There are about 50 different activities available at this island.

For each one, a note card or slide show provides background information, suggests a hypothesis to be tasted or a principle to be applied, and gives instruction for using one or more interactive objects to generate a data set;

- Eliciting performance: SL provides a broad prospective to create wide range of scenario-based simulations that can be used to strengthen already covered material and plan repetition. In game-like environment of SL this tool can be used extremely effectively. One of the examples is the game Generic, which is used very effectively in the learning process. In SL environment it is much easier to prompt students into the active and engaging learning experience. All the participants in this immersive learning milieu feel free to ask questions and get answers in the most convenient and sometimes fanciful way. When simulations are done in 3D environment it is much easier to try how to apply already received knowledge in practice. In the case of the SL Island discussed above, Genome Island experiments occupy a niche between written problem and a real life laboratory experiment, in which data collection might take hours or even weeks to complete and might vary from student to student. At this island students can perform experiments quickly, usually within few minutes, but each data set can be different (Clark, 2009).

- Providing feedback: Evidence indicates that feedbacks are very important in the learning process. It is an important aspect of reflection upon learning and may be central to the most effective learning experience (Jarvis & de Freitas, 2009). By means of feedbacks it is very easy to check weather a chosen learning strategy meets the project’s goal or not. In the SL environment learners can be provided with immediate feedback. For example, when learners are taking quizzes on the Sloodle Island in SL, every correct and incorrect reply is followed with immediate feedback, explaining why given reply is correct/wrong. In this way a process of testing is not only an assessment, but a process of filling gaps in knowledge as well.

- Assessing performance: SL provides fruitful field for assessing learners’ performance. Among e-assessment tools used in this environment the most widespread used tools are different types of quizzes (self-assessment quizzes and quizzes for grading), essays, group projects, rope-played and scenario-based activities and etc. In the SL there is a group called Transforming Assessment, where are described all those main e-assessment tools, which are used in the 3D learning environment more frequently.

- Enhancing retention and transfer: All the features of SL described above make enhancing retention and transfer much easier and effective. The immersive 3D environment provides opportunity to create game-based exercises to make learners look back and connect the course content to the real world situations.

Along with the obvious advantages of SL in teaching and learning, educators should bare into their minds that learners will not love being immersed in a virtual world just because they are the part of Millennial Generation (Wood, Solomon & Allan, 2008).
Researches indicated that for learners, it is very important that time and effort spent in the virtual world is equal to their needs and expectations. Therefore, it is very important what instructional and educational issues are involved in the virtual education.

DISCUSSION

SL milieus, designed onto an immersive avatar network, engage learners to work in a constructivist platform where distance related technologies are used and enhanced. As it is a well known fact that Internet-based distance learning strategies has led to online collective, team work based learning within the scope of ISDs.

The effective instructional models such as ADDIE, ASSURE or PIE help learners to work and collaborate in a learning model which enables online interactions between active users of SL. The SL platform on which instructional applications connect avatars and tutors via online activities mainly designed on cognitive theory and constructivist strategy of learning.

These strategies, instructional tools and technologies make technological integration easier while designing 3D courses on SL platform. Based upon the abovementioned concerns, the new digital innovations on 3D virtual simulations such as Second Life (SL) should be taken into consideration and analyzed within the concept of cognitive and constructivist learning in detail. As debated by many designers and researchers, the Internet-based distance learning technologies such as ISDs applied on SL platform has strong influence on collective online learning. Therefore, the advancements on these initiatives should be focused with great attention as well.

As also discussed by the authors earlier, the students can participate in unified activities, participate in a team, comprehend the course subjects and get a prompt feedback in SL’s dynamic mode; however, further studies on ISDs should be conducted in order to make online courses authentic learning milieu for users and all the aspects of ISDs within learning theories should be observed carefully. The cognitive processes (Gagné, 2009) discussed under different titles of this paper can be handled in order to make the learning experiences incentive; collective; self-regulating an interactive. Further studies on ISDs and their applications will make learners to participate in three-dimensional activities within distance learning.

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