Analysis of an Educational Location in Second Life based on Design Principles

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ABSTRACT

With the development of new technologies, some alternative platforms have been introduced to the internet users as communication and interaction tools. After the maturity of their baselines, some instructional (or constructional) information learning principles have been adapted to them. After taking on this educational responsibility clothes, design principles implementation in these educational virtual environments has become more of an issue. In this article, the architecture of the learning experiences in virtual worlds and type of the design principles are introduced. The importance of educational role of an environment, Explorer Island, in Second Life virtual environment platform is discussed and success/failure in adaptation of design principles for this environment is discussed.

Author Keywords

Virtual world (VW), virtual environment (VE), virtual immersive environment (VIE), tree-dimensional learning experiences(3DLEs), Second Life (SL), affordance, fidelity, presence, experiential, archetypes, macrostructures, interactive learning, identity and representation, avatar.

INTRODUCTION

According to Kapp and O'Driscoll (2010) to avoid the fate of the buggy - whip manufacturers while simultaneously achieving the fullest potential that VIE technology has to offer to transform learning, instructional designers must avoid falling prey to the routinization trap[4]. In fact, 3DLEs require a set of wholly new design principles that are unshackled from the classroom delivery paradigm and grounded in the affordances that VIE technology can lend to the learning experience[4]. When the issue turns into learning in 3D, the "learning" concept itself should be comprehended. Kapp and O'Driscoll state that the learning that occurs within a 3DLE surfaces at the moment when the lack of knowledge or capability of the participant intersects with the need to have that knowledge or capability to overcome a challenge or complete a specific task[4]. At this point, for a 3DLEs, the context is much more important than the content. Instead of a regular classroom context, the true potential of 3DLEs will be realized in demonstrating how purposeful they can be in allowing participants to act and interact toward a common goal, fail, try again in a different way, and eventually (but much more rapidly and safely than in real life), achieve the desired learning objectives[4]. With this approach the participant can learn while doing on his own.

There is a related research about emotions of participants and design elements conducted by K.-M. Chuah, C.-J. Chen and C.-S. Teh(2011) states that environment richness of the VR-based learning environment turns out to be a very influential design element[1]. It shows the strongest influence on the emotions of appealing, curious and lively. This is consistent with the findings in previous studies (Ngo, Teo & Byrne, 2003; Park & Lim, 2007) that showed how the attractiveness of the computer-based instructional materials increases learners' positive emotions, which in turn improve their learning performance[13]. The second most influential design element is coaching, which have strong relationships with six emotions especially on confident and motivated. This finding corresponds to the study by Kennewell, Tanner, Jones and Beauchamp (2008) who found out that providing relevant guidance and feedback increases learners' confidence in completing a task[10].

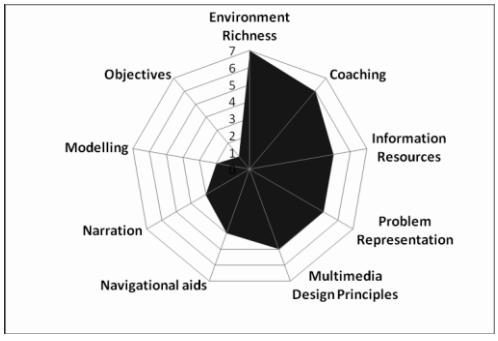

Figure 1 - The number of emotions as influenced by the design elements [1]

OVERVIEW

Since 1995, the Gartner Group, an information technology research and advisory firm, has used cycles to characterize the pattern of over-enthusiasm or hype and subsequent disappointment that typically occurs upon the introduction of new technologies. This metric also shows how and when technologies move beyond the hype, and through offering practical benefits, become widely accepted. The following diagram (Figure 2) illustrates the Hype Cycle for SL and shows the growth and adoption rate of SL by education [2].

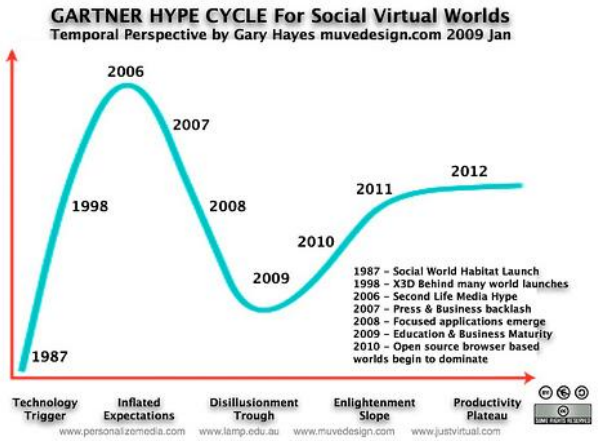

Figure 2 - Gartner Hype Cycle for Social Virtual Worlds [2]

This figure shows that virtual worlds are now right in the middle of the trough of disillusionment which means people are still pretty down on virtual worlds but they are closer to actual productive use [3]. Educational perspective is one of the productive usage of Second Life.

A KZERO(2012) search shows the virtual worlds/mmos categorized by sector[11]. This figure (Figure 3) can tell us that educational trend is increasing through 3DLEs.

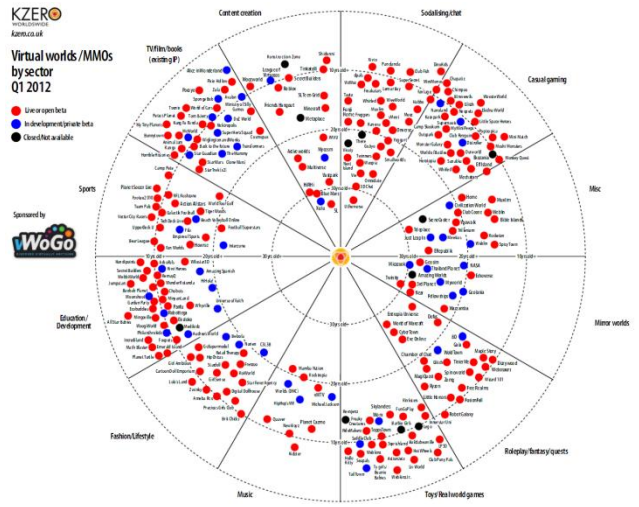

Figure 3 - Virtual Worlds/MMOs by Sector [11]

Moreover, the competition in educational sector among the VEs is really high according to the findings by KZERO (2013)[12]. The below figure (Figure 4) shows that education/development is one of the three most competitive sectors in VEs.

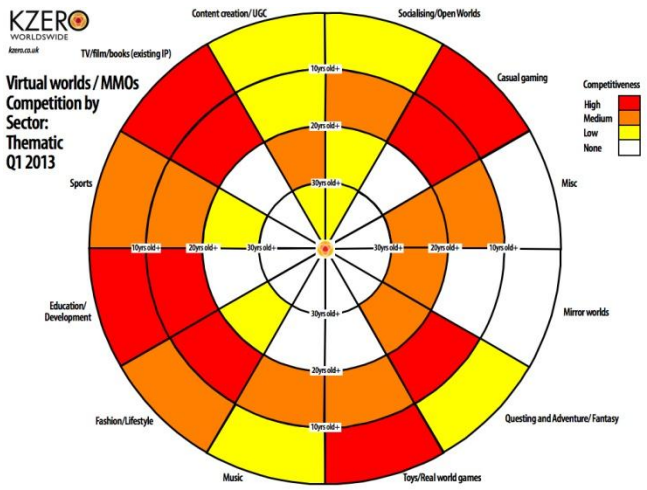

Figure 4 - Virtual Worlds/MMOs by Sector [12]

When we look at Second Life virtual platform, it is easy to see that instructional learning is being taken into consideration and new destination lands are being created. As seen in the figure below (Figure 5), approximately 3% of destinations, which is 2356 in total, are based on educational service.

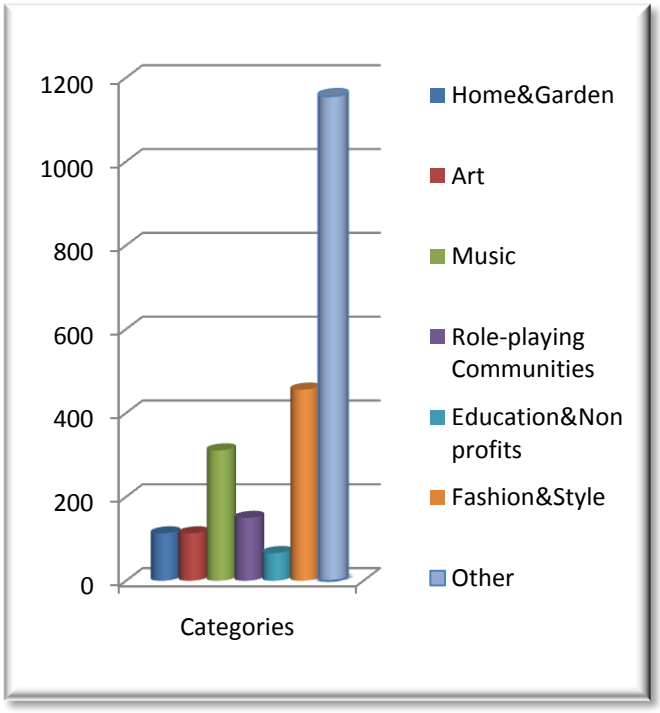

Figure 5 - Destination Numbers By Category in Second Life[18]

Throughout these numbers, there should be a heuristics of designing a learning environment to increase the number

and effectiveness of educational 3DLEs. One of the mostly acceptable 3DLEs design principle model is proposed by Kapp, O'Driscoll and some of the most respected and recognized 3DLE designers in the field: Chuck Hamilton, Christopher Keesey, Randy Hinrichs, Ken Hudson, Steve Mahaley, and Sarah Robbins..

PROCEDURE

3DLEs Design Principles

Kapp and O'Driscoll states that to achieve the desired design outcomes, their proposed model outlines eight design principles (Figure 6) to guide instructional designers in their quest to create immersive and engaging 3DLEs[5]. Their model consists of two main principles: grounding principles and experiential principles.

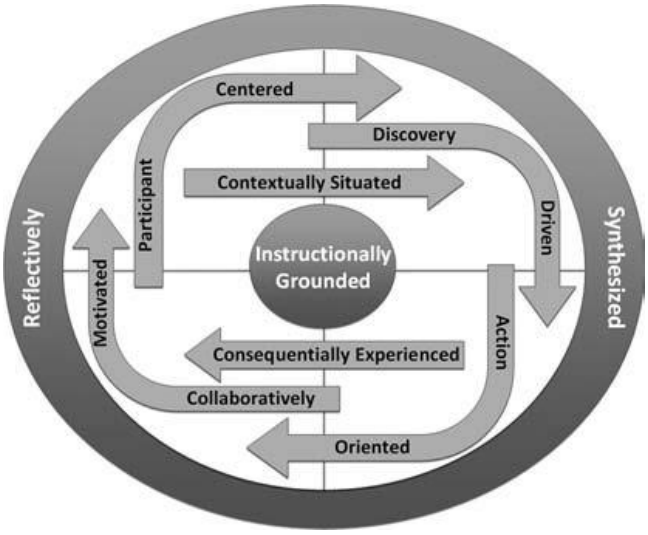

Figure 6 - 3DLEs Design Principles[5]

According to their model, for a virtual environment to be instructionally grounded, an environment should target a vetted business need and should ensure the 3DLE approach is the most effective way to transfer the learning objectives to on-the-job performance. To be reflectively synthesized self-reflection and group based experience should be included in the design. To be participant centered, the participants' actions and interactions in the environment should have consequential outcomes within the learning experience itself. To be contextually situated, the context must be authentic and action oriented, but it must also be bounded in such a way that it ensures all of the learning objectives are encountered by the participant without it being too obvious or onerous. To be discovery driven, once and the agency has been defined, the next instructional challenge is to establish motivation for sustained and engaged interaction within the 3DLE[6].

Macrostructures

The defined 3DLE principles are logically fit into four larger macrostructures: Agency, Exploration, Experience and Connectedness (Figure 7). These macrostructures are activated within these 3DLEs principles[8].

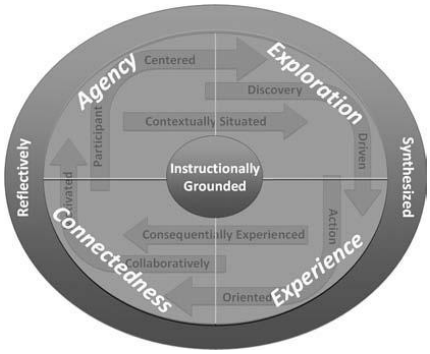

Figure 7- 3DLE Macrostructures[8]

Archetypes and Sensibilities

Archetypes (Figure 8) are the basic building blocks of 3DLEs. Each archetype implementation achieves a specific set of learning outcomes and activates a specific macrostructure[9].

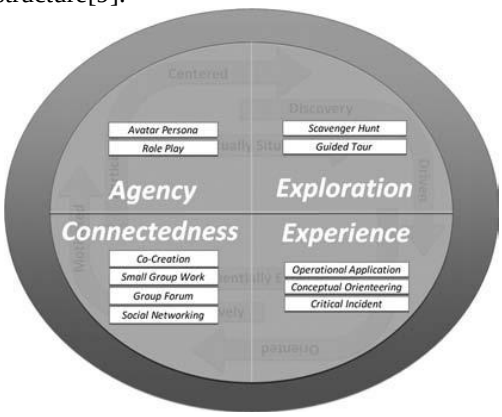

Figure 8-The Eleven 3DLE Archetypes Mapped to the Four 3DLE[9]

Finally, to round out the development of a comprehensive 3D learning architecture, it is also possible to house the seven sensibilities(Figure 9) within the same four macrostructures[9].

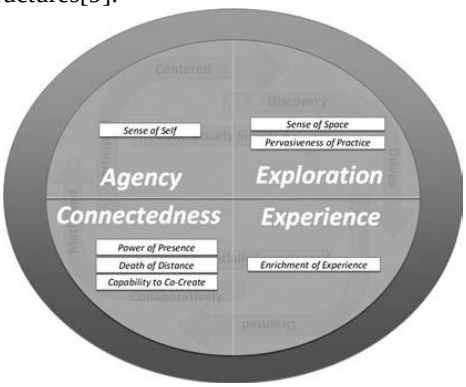

Figure 9- The Seven VIE Sensibilities Mapped to the Four 3DLE Macrostructures[9]

ANALYSIS

Explorer Island

Explorer Island is the home of NASA Jet Propulsion Laboratory in SL. The category of the destination is educational.

Figure 10- Explorer Island Starting Point in SL

The general information about the environment is as follows:

Organization Background: The National Aeronautics and Space Administration (NASA) is the agency of the United States government that is responsible for the nation's civilian space program and for aeronautics and aerospace research[14].

The Challenge: Some of the challenges in designing a 3D virtual environment are strengthening NASA and the Nation's future workforce, attracting and retaining students in science, technology, engineering and mathematics, or STEM, discipline and engaging community members in NASA's mission[15].

Why 3D?: 3D environments provide virtual, immersive educational experience to students and educators. Moreover because learning is on demand on 3D environments, this approach is embraced by NASA[16]

Making The Case: As a delivery mechanism this 3D environment is implemented to reach the next generation of explorers to inspire, inform, and involve them in NASA research activities and encourage them to pursue science, technology, engineering and mathematics fields with simulations, visualizations, immersive environments, gameplaying and learner networking[17].

RESULTS AND DISCUSSIONS

While discuss the design principles implemented in Explorer Island, a model created by Kapp and O'Driscoll has been used[7]. In this model, they propose to ask some set of questions to ensure the environment meets the related design principle. Below are the mentioned questions and answers for the case Explorer Island environment:

Design Principle	Key Questions to Consider	Answers(for Explorer Island)
Instructionally Grounded	Is the learning intervention addressing a vetted business or educational need?	*YES(Answer is in "the challenge" part)*
	Are the learning objectives optimized to address the business or educational need?	*YES. Through simulations, visualizations and immersive environment is designed properly.*
	Is a 3DLE the most effecient and effective mechanism for transferring the learning?	*YES for today's technology. Interactive environments provide a quick and effective way for learning.*
Participant Centered	Does the design place the participants in the center of the experience?	*YES.*
	What role(s) do the participants play in the experience?	*Participant is like a museum visitor and get information from media objects and experience some of the simulations.*
	What actions and interactions can the participants take to encounter teachable moments within the experience?	*The participant should interact with media items to retrieve detailed information.*
Contextually Situated	What situational contexts best accommodate the learning objectives of the intervention?	*Exploration context for retrieving information and witnessing the simulations.*
	What is the role of the facilitator, other participants, and the environment itself in creating an	*Interesting pictures, realistic models and simulations*

	authentic situational context for learning?	
Discovery Driven	What is the minimum set of guidelines that need to be established to catalyze action within the learning experience?	*Going around and interacting with the objects.*
	What information or incentives can be selectively revealed within the learning experience to motivate engagement and collaborative action within the experience?	*Inspecting (especially telescopes) is ensuring the engagement because a different interactive function is added. There is no collaboratve incentive to be revealed within the environment.*
Activity Oriented	What is the set of episodic activities that will immerse the participants in the learning experience?	*There is a series of contextually set-ups to be interacted. Reading information cards and interacting with media data or objects(in simulation case) are the only activities.*
	What are the key actions and interactions within these episodes that trigger teachable moments for the participants?	*There is continuous set of activities valid in all set-ups, which is just interacting with the objects.*
Consequentially Experienced	How will participants be required to demonstrate their ability to perform?	*In fact there is no ability to require. To gain experience, being curious about space is enough to interact with the objects.*
	How is iterative trial and error and feedback built into the learning experience?	*There is no additional feedback mechanism, participant report via secondlife platform about the environment.*
	What are the consequences of failure for the participant?	*There is only one failure case about gaining experience is that if the participant only walk around and not to interact with the information objects.*
Collaboratively Motivated	How will collaborative and co - creative action on the part of the teams be incented and rewarded?	*There is no co-creative action. Only seminar rooms and lecture halls are as collaborative context. If some objects in the environment were designed as requiring co-interaction to initiate, then that principles could be implemented.*
	How is collaboration encouraged by the design?	*There is no currently. Shop and seminar buildings can be improved to support collaboration for example not to buy something unless asking a seller about the object.*

Reflectively Synthesized	How is personal refl ection accommodated in the design?	*Some free concept related inventory objects are given to the participant, to make her feel like she belongs to there for that moment.*
	How are team after - action reviews accommodated in the design?	*There is no team work here. But for example to initiate a propulsion in simulation, team work can be needed.*

Table 1-Key Questions an Instructional Designer Should Ask[18]

CONCLUSION

According to the answers above we can say that Explorer Island environment is a learning environment which let the participant get information by interaction with media objects(like presentations) or environment objects like telescopes, exploration by walking around or hanging with a walking asteroid, experimentations by witnessing the simulations and connection with other participants in seminar rooms by watching the presentations together. And all these actions are done by the participant himself and all the actions are set for the participants. So when we analyze Explorer Island in terms of macrostructures it is obvious that all four macrostructures are covered:

- **Agency**
- **Exploration**
- **Connectedness**
- **Experience**

There are signs and inner maps to guide the participants. Sometimes the participants are students in seminar rooms sometimes explorer in telescope experiment and sometimes technician to start a simulation. So, there is a role-play factor (Figure 11). If some telescope setups or rockets are enabled to create from some items then co-work could be activated.

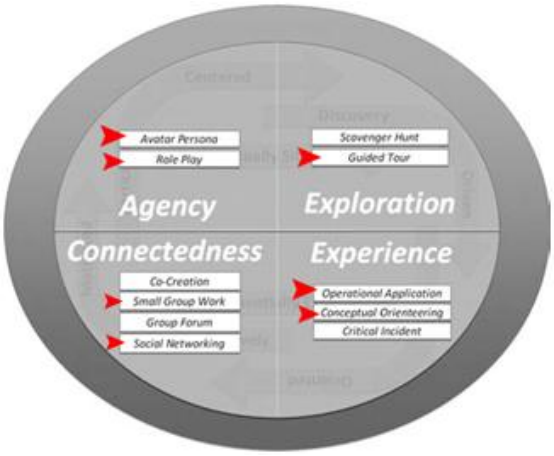

Figure 11- Archetypes Activated By Explorer Island

The sense of self, space, practice, presence and experience are activated with Explorer Island (Figure 12). Co-create factor is not enabled in this environment.

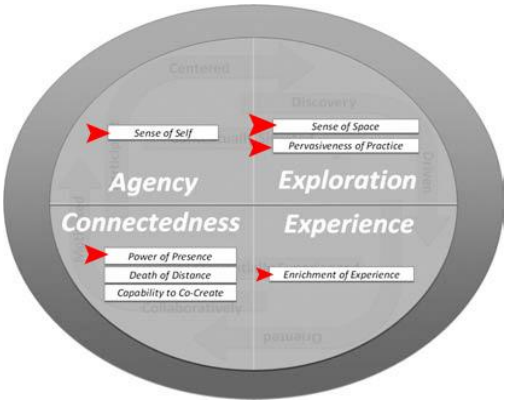

Figure 12- Sensibilities Activated By Explorer Island

Figure 13- Some Screenshots from Explorer Island

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