ABSTRACT: Virtual worlds are emerging technologies that offer collaborative learning environments for both synchronous and asynchronous distance education. Recently, there is an increasing demand for using 3D (three-dimensional) learning environments in all areas of education because of the affordances they provide for learning. Second Life is one of the virtual worlds developed by Linden Lab Company which gives the chance to users to interact with each other. Users make these interactions through avatars which are the virtual representations of the users. This paper will include information about the design and the development of the 3D virtual learning space in Second Life, “Recycle It”. The main purpose of this 3D virtual environment is to teach elementary level students the topics including “Recycling”, “Energy Saving” and “Conscious Consumption”. In the presentation, the process of the design and the development of the environment and the experiences that we gained will be presented.

Keywords: Virtual Worlds, Second Life, 3D, 3D Learning Environment, Virtual Learning Environment, Elementary Students, Conscious Individuals, Livable Environment, Recycling, Energy Saving, Conscious Consumption.

INTRODUCTION

Three-dimensional virtual worlds are one of the emerging technologies currently being used in both traditional classrooms and distance education (Dickey, 2005). Petrakou (2010) defines virtual worlds as the providers of high level of interactivity because they allow synchronous communication with a spatial dimension. Three-dimensional virtual learning environments (3D VLE) can serve to motivate learners to engage in a series of purposeful educational inquiries without losing interest or sidestepping intended learning goals (Omale, Hung, Luetkehans & Plagwitz, 2009). 3D Virtual worlds have a considerable potential as a learning tool. These words give users ability to perform tasks which are difficult or dangerous in the ‘real world’.

The most common three features of virtual worlds are the illusion of 3D space, avatars that serve as visual representations of users, and an interactive chat environment for users to communicate with one another (Dickey, 2003). Virtual worlds allow social interaction and collaboration in education. Also these worlds can change and grow to meet users need (Falloon, 2010). Virtual spaces give children opportunities to construct their identities, learn skills like decision making, allow children to express their opinions and help them to gain experience. Children participation to these environments is crucial and it depends on relationship between structure and agency (Tuukkanen, Iqbal, Kankaanranta, 2010). In recent years there are an increasing number of researches made on the educational use of 3-D virtual worlds. The results of those researches report that learners feel motivated as a result of the graphical interface of 3-D virtual worlds since they are visually appealing, animated and interactive (Omale, Hung, Luetkehans & Cooke-Plagwitz, 2009).
Briefly, virtual environments provide learning activities to learners and encourage them in participation, exploration, interaction, collaboration and exchange ideas so learners have great learning experiences on this environment (Bailey & Moar, 2003). Second Life (Linden Lab, San Francisco), Active Worlds (Active Worlds Inc., Las Vegas), There (There Inc., San Mateo) are some examples of virtual worlds.

Second Life is a 3D internet based virtual environment developed by Linden Lab Company which gives the chance to users to interact with each other. Second Life environment provides users with the sense of being there namely social presence with avatar usage. Users can act in the environment with their personal avatar which helps them to feel themselves in the environment. This virtual world supports its users by wide range of communication tools, high quality of graphics and easy use of building options. Edirisingha et al. (2009) indicated that Second Life can facilitate social presence for collaborative learning activities. Social interaction is the key issue for collaborative learning, the existence of collaboration, brings social interaction together (Petrakou, 2010). Edirisingha et al. (2009) found in their study that Second Life provides a socialized environment.

There are many studies on use of Second Life for educational purposes. Most of them focus on higher education level. For example linguistic studies are very common type of studies on the Second Life environment in higher education. Hence projects in second life have to be evolved in complex scenarios and more interactions with environment and more advanced use of in world tools (Peachy, Gillen, Livingstone, Smith-Robbins, 2010). While the project was being developed, those issues were considered and a high interactive environment was developed as much as possible.

One important reason for that study was that when the way students make sense of their natural world is understood, it is possible to create a science curriculum that makes sense to all students Aikenhead (1996). By developing a project in 3D environment, we tried to provide learners a realistic enjoyable environment in which they can have chance to make sense of their world. Beside this item the critical issue is that most of the schools especially primary (elementary) school has little knowledge of these emerging technologies among the teachers (Bailey & Moar, 2003). Computers frequently used in learning activities and lessons are presented with the traditional ways. This project can be thought as a step for the future applications of 3D educational environments.

DEVELOPMENT PROCESS OF RECYCLE IT!

**Project Information**

Within the scope of project, an area in Second Life was designed for science education. The name of the project is “Recycle It” and third year elementary group students are the target of project. The main purpose of the project is to inform target learners about “Energy Saving”, “Recycling” and “Conscious Consumption” topics on a 3D virtual environment and provide them to be conscious about those topics. To reach those goals; all the essential information were provided by using various visual materials.

This educational environment is an example of asynchronous learning. In asynchronous learning environments people have chance for learning at anytime-anywhere. Therefore, participants have the chance to join the environment whenever they want and they can discover the environment by themselves. Our environment combines self-study with asynchronous interactions to promote learning. With the help of asynchronous learning environment, learners are free to access the environment and instructional materials whenever and wherever with an Internet connection.

**Virtual World Environment & Activities**

For the project, a small village was designed in Second Life. In that village different kinds of buildings and areas were composed for different kinds of activities. (Some views from the area are provided in the Appendix A). Within the scope of the project, learners are assumed to visit “Dream Town”. The reason behind the name of the city is that, the people living in it are conscious people who are “saving energy”, “recycling” and “conscious consumers”. According to the scenario of the project, learners should finish three main activities to deserve to live in “Dream Town”.

In the following main activities and buildings are given:

1) **Education Area:** This area was designed in the entrance of the village for giving important details about the subject. Information boards including relative information about activities and the importance of the subject were added. Besides the boards a sitting area was placed in the
middle. In the case of learners attend the environment synchronously, they have chance to discuss with others.

2) **Home:** Home was designed for the “Energy Saving” activity. By looking at the information boards on the walkways, learners have to visit home firstly. The house consisted of rooms such as living room, bedroom, kitchen and bathroom. In each room, learners have to achieve different goals. For example, when the learner comes in the living room, s/he notices that the TV was open but nobody was watching. Therefore, s/he had to close the TV to prevent unnecessary energy consumption. In bathroom, s/he had to turn off the tap when the water was flowing redundantly. After completing all the activities, learners have to go to the second area.

3) **Recycling Area:** By looking the sign and information boards, learners arrive the second area which is related with “Recycling” activity. This area included garbage thrown around and recycle bins for glass, paper, plastic, metallic materials. The activity learners have to achieve is to gather recycling materials thrown around and put them in recycle bins according to their substances. After completing the activity, learners will move to the shopping center by looking the information boards.

4) **Shopping Center:** This part was designed for the third activity which is “Conscious Consumption”. Within the scope of that activity, learners have to do shopping by paying attention to the “expiration date of the product” and “TSE standard”.

5) **Amusement Park:** This area was designed for rewarding participants. After completing all the activities, learners can visit amusement park and have an enjoyable time.

**Making The Case**

As Kapp and O’Driscoll stated “In designing 3D learning environments, content is king, but context is the kingdom.” Context helps learners to understand topics, procedures and definitions on 3D learning environments. In this context learners have to act and interact with environment to achieve desired learning goals. Hence, to achieve desired outcomes design principles are used to guide instructional designers to create 3D learning environments (Kapp & O’Driscoll, 2010).

In the following section design principles which were applied in our project are mentioned:

**Instructionally Grounded:** This project aims to provide learners to be conscious about “energy usage”, “recycling” and “conscientious consumption”. It is important to design a realistic environment and provide learners to apply the things they learned in real life. Since Second Life provides participants to feel like they’re “there”, this environment can be considered as an effective and efficient mechanism for transferring the knowledge.

**Participant Centered:** Virtual worlds provide a way in education to put the learner in the center of the learning. In those environments, learners have chance to be free to discover the environment and instructional materials. In that project, many possibilities were tried to improve learners’ learning experiences by developing some applications related with the topic and let the learners discover the environment themselves.

**The actions and interactions that learners can encounter:**

Learners can understand the importance of the topic by reading the expressions provided on information boards. Learners can discover what they are required to do in the environment to be a conscious individual. For example learners are required to:

- turn off the TV, tap and lights.
- do a shopping considering the issues about conscious consumption like: expiration date of the product, TSE standards.
- collect garbage around them and throw that garbage into waste box related to their substance like glasses into glass waste box.

**Contextually Situated:** Since 3D learning environments require the creation of a specific context during learning, it was tried to create an environment to meet objectives of our topic. Learners can find many things around them to discover. While they are discovering the environment, they will also read information and get the main points and key concepts necessary to make them conscious. In other words, while they are acting in the environment, they can understand the reason behind their actions. Those reasons for their actions were provided on boards. For example: What happens if they do not act consciously about energy saving?

**Discovery Driven:** Self-paced learning materials were developed for that project that provides learners gain knowledge by discovering. The learning content can be discovered independently. Learners feel motivated as a result of the graphical interface of 3-D MUVEs since they are visually appealing,
animated and interactive (Omale, Hung, Luetkehans & Cooke-Plagwitz, 2009). In addition to that, to increase the desire of learners to discover, we tried to motivate them. While learners complete all the required activities, they were provided with a reward. An amusement park was designed for motivating students; they can use that part after completing all the tasks.

**Activity Oriented:** 3-D virtual environments can serve to motivate learners to engage in a series of purposeful educational inquiries without losing interest or sidestepping intended learning goals (Omale, Hung, Luetkehans & Plagwitz, 2009). In the project, different kinds of experiential activities were provided to learners. The experimental side of our project can increase the curiosity of learners and will help them to immerse to the environment. Learning will occur as a result of those activities.

**Consequentially Experienced:** We think that learning is an iterative process. For that reason, we embedded trial and error into the learning environment. Learners have chance to make error in the environment. To illustrate, if learners throw the glass in paper waste box, a warning occurs and they try until they find the truth.

**CONCLUSION**

Virtual learning environments foster learning by presenting problem-solving tasks. By this way learners have intrinsic motivation and with the help of role playing tasks they feel immersed in the learning environment. One important thing that provides learners to feel immersed in 3D virtual environments is the avatar usage which represents users. With the help of avatars users can move in the environment and feel themselves as they are there. This point is important for providing learners to internalize the given subject. Virtual worlds are real life simulations which allow learners to practice while they are learning the content.

This project provides all the items mentioned above, which brings a new idea to science education. Future applications of science education in 3D environment should be developed for attracting students’ attention.

**REFERENCES**


APPENDIX A

Picture 1: The information board at the entrance of the Recyle It!

Picture 2: A part from the house
Picture 3: A part from amusement park