Open Wonderland: A Potential 3-D MUVE for Teaching and Learning

Mohd Hishamuddin Abdul Rahman, Noraffandy Yahaya, Noor Dayana Abdul Halim, Danakorn Nincarean Eh Phon

Abstract

The use of 3-D MUVEs in education is still in its infancy in Malaysia, particularly in Universiti Teknologi Malaysia. In order to promote the utilization of this technology, this article revolves around the features of 3-D MUVEs which are highly beneficial in teaching and learning, where some of the features are not offered in most of 2-D applications that are commonly used today. Additionally, this article also focuses on promoting the use of an open source 3-D MUVE, Open Wonderland as an alternative for infamous Second Life virtual world as an appropriate platform for conducting virtual learning activities.

1. Introduction

1.1. Online learning with 2-D applications

Learning activities have experienced many levels of changes. In the past, it was conducted in the classroom, where teacher and students meet each other face-to-face (Zhang, Zhao, Zhao & Nunamaker Jr., 2004). However, this scenario began to change when technology became available as a medium for teaching and learning since late of the 20th century. This is due to the increment of current technology capability, particularly the Information and Communication Technology (ICT) (Mahmud, Ismail, Abdul Rahman, Kamarudin & Ruslan, 2012).
As we all know, ICT has produced tones of applications that can be utilized in teaching and learning. It has been said that among those applications, there are several which are quite popular among educators, namely online chat (Sins, Savelsbergh, van Joolingen & van Hout-Wolters, 2011), online forum (Rienties, Giesbers, Tempelaar, Lygo-Baker, Segers & Gijselaers, 2012) and social networking site (Baker, Wentz & Woods, 2009). These applications, which are categorized as the Web 2.0 technologies, have given a bunch of benefits to the learning process. It is due to its capabilities in facilitating and accelerating the process of communication, information's searching and sharing, and also enable learning activities to be conducted anytime and anywhere, which cannot be accomplished through the conventional methods (Bennett, Bishop, Dalgarno, Waycott & Kennedy, 2012; Chiu & Hsiao, 2010; Petrakou, 2010).

1.2. Inadequacy of 2-D applications

Despite of having well-known capabilities that are highly beneficial for teaching and learning, those online 2-dimensional (2-D) applications are still lacking in certain ways. This issue had been raised by many researchers and can be segregated into several categories. In term of communication, it has been said that multi-user 2-D applications were depending too much on the use of text as a medium of communication (Omale, Hung, Luetkehans & Cooke-Plagwitz, 2009). Furthermore, learning activities that take place in a virtual learning environment (VLE) generated by those 2-D applications mean that face-to-face communication became limited or no longer available for students and educators (Chiu & Hsiao, 2010). Thus, without the use of body languages, face expressions and even voice tones as a mean to convey message among each other, Sutcliffe and Alyares (2012) have referred this as a lack of non-verbal communication. Other than communication, interactivity in 2-D applications is also an issue that has been brought up. Surely it is undeniable that 2-D applications are all interactive compared to face-to-face learning, yet it is still not good enough to support certain type of learning, especially collaborative learning. As mentioned by Bronack, Riedl and Tashner (2006), learning activities are limited in this kind of environment. Hence, it is not surprising when learning activities by the use of 2-D application are considered by the students as boring and do not stimulate their experience (Sutcliffe & Alyares, 2012) and also could lead them to experience dissatisfaction with their learning (Bouhnik & Marcus, 2006; Wu, Tennyson & Hsia, 2010).

Being aware about all the weaknesses that have been mentioned before, educators nowadays have been shifting towards the use of new application with the form of 3-dimensional (3-D), or 3-D Multi-User Virtual Environment (3-D MUVE) to be precise, for teaching and learning (Duncan, Miller & Jiang, 2012; Hew & Cheung, 2010). In the next section of this paper, we will discuss further about the unique features of 3-D MUVEs which are valuable for teaching and learning activities, the type of 3-D MUVEs currently being used by the educators around the world, and follow up by our justification of the Open Wonderland as an appropriate 3-D MUVE to be used for teaching and learning.

2. Three-Dimensional Multi-User Virtual Environment

2.1. Background

Based on the history of its development, 3-D MUVEs or also known as virtual world, said to be rooted from virtual environments of role-playing games, for instance, a multi-player online games (MMOGs) (Duncan et al., 2012). Nevertheless, the major difference which differentiated a 3-D MUVE from a MMOG is that most of the 3-D MUVEs were developed without any specific objectives of storylines. It is an environment that grant users freedoms to completely control the environment (Warburton, 2009). In other word, the user himself or herself can determine the objective or storyline for the virtual world. Just as the online multi-user 2-D applications, 3-D MUVEs can also be accessed by numerous users at the same time (Gamage, Tretiakov & Crump, 2011).
However, thing that made 3-D MUVEs unique is the sort of application that came with the ability to generate a virtual environment which consist of height, width and depth (McKerlish & Anderson, 2007), which is completely different from the VLE created by any 2-D applications. Besides, 3-D MUVEs also comprise of some unique features which can be utilized in teaching and learning that are rarely found in other 2-D applications, which will be discussed further in the next section. Hence this has attracted educators from around the globe to construct online learning activities in 3-D MUVEs. As a result, it popularity as a medium for teaching and learning, as stated by Duncan et al. (2012) has increased significantly in the past few years. This scenario has been mentioned as well in the Horizon Report of 2008, Australia-New Zealand Edition by the New Media Consortium (Johnson, Levine & Smith, 2008). The recent improvement of technologies' capabilities have also became one of the ignition for this scenario to occur (Choi & Baek, 2011).

2.2. Features of 3-D MUVE and its impact on learning

As stated in the previous section, there are several features of 3-D MUVEs which can be beneficial for teaching and learning. From the previous literatures, we have extracted some of the features that we assume as noteworthy. The features are as stated below.

- Offer a realistic and immersive virtual environment (Ibáñez, García, Galán, Maroto, Morillo & Kloos, 2011)
- Provide a flexible and persistent environment (Girvan & Savage, 2010)
- Represent user with 3-D avatar as an online identity (Peterson, 2005)
- Support verbal and non-verbal communication (Andreas, Tsiatsos, Terzidou & Pomportsis, 2010)
- Allow user to create and manipulate the world and virtual objects, and also let them adjust the camera to view the world from different perspectives (Dalgarno & Lee, 2010)

Thus, in a learning session that is conducted in 3-D MUVE, students generally learn by means of exploring the virtual world in order to obtain information, creating and manipulating virtual object based on the task and also interact with each other through their avatar (Gamage et al., 2011). According to de Freitas, Rebolledo-Mendez, Liarokapis, Magoulas and Poulouvasilis (2010), this type of learning bestow students with an immersive experiences. By having that sort of features, the usage of 3-D MUVEs has given some positive impact on learning as stated in previous researches. For instance, the usage of 3-D MUVEs helps created an enjoyable virtual learning environment for students (Apostolos, Andreas & Thrasyvoulos, 2010). It is likely due to the game-like environment of this technology. Moreover, 3-D MUVEs are also able to create an environment which encouraging one of the most important elements in online learning, that is sense of presence (Chen, Warden, Tai, Chen & Chao, 2011). It seems that some of the factors which affecting the sense of presence are the utilization of avatars as users' online identity, the options to communicate by using not just text but other medias as well, and the level of abstraction of the virtual world. As a result, the application of 3-D MUVEs in online learning has been reported to increase students’ engagement (Bouta, Retalis & Parasekva, 2012), satisfaction (Jestice & Kahai, 2010), interactions and motivation as well (Beltrán Sierra, Gutiérrez & Garzón-Castro, 2012).

3. Open Wonderland

3.1. Types of 3-D MUVE

There are at least two categories of 3-D MUVE, as stated by Apostolos et al. (2010). Those categories are proprietary 3-D MUVE and open source 3-D MUVE. The first category, the proprietary 3-D MUVE, is an application where the user must pay in order to access some features in that particular virtual world. Second Life, Active World and There are some of the 3-D MUVEs which fall into this category. Whereas the next category has been labelled as open source 3-D MUVE. Unlike the other category, the open source 3D-MUVEs can be used
by any user for free and give them full control of the environment as well. Examples of open source 3-D MUVE are Open Wonderland and Croquet. Bear in mind that there is no category that is superior to another, because each of them have its own advantages and disadvantages. However, among both categories, there is one 3-D MUVE which has been considered as a mature 3-D MUVE for teaching and learning, namely Second Life (Warburton, 2009). Its popularity among educators as an online teaching and learning platform has been stated by Girvan and Savage (2010), where most of recent literatures are focusing on the utilization of Second Life.

3.2. Why choose Open Wonderland?

"If Second Life is an excellent 3-D MUVE, why do we need to shift to Open Wonderland?". That is perhaps a question which will arise from several educators and researchers. Yes, we also acknowledged the fact that Second Life is the most powerful 3-D MUVE around, where it can bring a lot of benefits for teaching and learning processes. Nevertheless, there are certain things about Second Life as written in previous literature which we believe are quite problematic for certain communities, especially for us and our university, also for our country as well. In our future research, these things have became factors that lead us not to use Second Life. We will discuss about these factors together with reasons of why Open Wonderland is the best 3-D MUVE for our research and perhaps for other researchers with a similar background as well.

The first factor is about the budget. As stated by Apostolos et al. (2010), a proprietary 3-D MUVEs like Second Life requires the user, who want to fully access the world, to pay for certain amount of cash to the developer. The fee is pretty expensive (Sutcliffe & Alrayes, 2012), particularly for research team with low budget like ourselves. Fortunately, there is a free version of Second Life offered by Linden Labs, the developer of this 3-D MUVE. However, it only allows users to explore certain places and use some basic functions and controls (Tsatsos & Konstantinidis, 2009). Moreover, there are also some issues of privacy regarding of the free version of Second Life. As reported by Petrakou (2010), she spotted an outsider who suddenly appeared during the lecture that was conducted in the virtual world. Luckily for her that the students did not really get distracted by the appearance of the outsider. As for that case, we believe that privacy is an important thing in order to conduct teaching and learning in virtual world, especially for an open virtual life like Second Life which can be accessed by many people around the world that are not related to our research. However, only money can buy privacy in this commercial virtual world. To put this into a simple word, we need a private virtual world with many unrestricted functions and can be used for free. Does this kind of virtual world really exists? Yes it does. The name of that virtual world is Open Wonderland, which is formerly known as Project Wonderland (Joshi & Gardner, 2012).

Unlike Second Life, Open Wonderland is a Java-based open source 3-D MUVE (Ibáñez et al., 2011). In other word, it can be used by any people for free. It was originally developed by Sun Microsystems before it became a fully independent and open source virtual world (Kaplan & Yalenkovish, 2011). This nature of Open Wonderland has made us believe that it is the best 3-D MUVE for our research. However, we did not simply select this virtual world just because it is free. There are other criterions of Open Wonderland that we took into consideration. Firstly, is about the privacy and control. As we stated before, we need privacy in order to conduct learning activities of our research and the full control of our world. Open Wonderland is a 3-D MUVE which provide a privacy for the user without any charges applied and it allows user to completely control the virtual world (Chen et al., 2011). In other word, the user who is also the admin is the master of the world. He or she can control who is legal to access the virtual world, so that means no outsider is allowed. Plus, the admin also can control properties of some elements in the virtual world. For example, the admin is able to make some object visible to one group of students where the rest cannot see it (Arroyo, Kloos, Espiga, Calle, Rodríguez & Hernández-Leo, 2010). Furthermore, the extensible nature of the Open Wonderland provides the admin with opportunities to modify and extend it functionalities, especially for someone who is an expert with Java technology (dos Santos, Guetl, Bailey & Harward, 2010). As for the other user, mainly the students, they can freely control their avatar
and use any tools available that are not restricted to them. Thus, we can assume that Open Wonderland is not just a free to use 3-D MUVE, it also a flexible and private virtual world.

Second criteria of a Open Wonderland that we paid attention to is its characteristic as a learning tool. According to Dalgarno and Lee (2010), there are 2 categories of characteristic of a 3-D VLE, which are representational fidelity and learner interaction. Each of those categories comprises of several characteristics. After we made a comparison between those characteristics and characteristic of Open Wonderland, we found that both characteristic mostly match with each other. First of all, to be able to display a realistic environment is one of the characteristic of 3-D VLE, and Open Wonderland has this characteristic as well. As in the research conducted by Ibáñez et al. (2011), they have successfully build a environment which is similar to the real town for language learning. However we believe that realistic here does not means that it should look exactly like the real things, as long as it can make each user feels immerse with the environment should be fine. Then the next characteristic of 3-D VLE which matched with Open Wonderland is the use of avatar as representation of every users. Open Wonderland provides an option for the users to use custom avatar or create their own avatar (Chen et al., 2011). Although it is quite limited compared to what the users can do to their avatar in Second Life, Open Wonderland is still allows them to modify many aspects of their avatar, such as hair colour, clothes, shoes and many more. We assumed this is good enough to provide students with sense of presence in the virtual world. Speaking of sense of presence, audio is one of elements that can increase that sense (Dinh, Walker, Song, Kobayashi & Hodges, 1999) and spatial audio is also included in the list of characteristics for 3-D VLE. Therefore by using Open Wonderland which also wield the spatial audio characteristic (Kaplan & Yalenkovish, 2011), not only we can let students communicate using their voice and put some sound effects in our virtual world for them, but we also can simultaneously stimulate their sense of presence.

Furthermore, the availability of avatar and spatial audio in Open Wonderland indirectly suggested that this 3-D MUVE has met another characteristic of 3-D VLE as listed by Dalgarno and Lee (2010), which is support the verbal and non-verbal communication. For example, Open Wonderland allows the users to make use of the chat box and voice over function in order to communicate with each other verbally, and also let them communicate using the non-verbal methods for example by exploiting the gestures provided for the avatar. The next characteristic on the list is known as embodied actions, such as view control, navigation and object manipulation. From our viewpoint, this one is quite important to considered if we intend to conduct learning activities in a 3-D MUVE. If the 3-D MUVE does not support those actions, there is a high probability that the learning process will be hindered. As for Open Wonderland, we found that this 3-D MUVE supports all those actions such as it let the users change the viewing angle in order to view the world from different perspective. Moreover, Open Wonderland also let the users control their avatar to explore the virtual world and allow them to create and manipulate an object and also interact with other objects (Arroyo et al., 2010). In fact, there are other characteristics of 3-D VLE which match with Open Wonderland that we have not discussed in this article, because we feel that what have been discussed here are sufficient enough to inform our readers about the capabilities of this 3-D MUVE.

Apart from that, the recent capability of our nation ICT particularly in our university is not as great as what they have in every modern country. This has become one of the factors that preventing us from using Second Life. Based on our observation, the internet speed of our faculty, which is crucial for running a 3-D MUVE, is not good enough to run Second Life smoothly. There is a solution to tackle this problem, which is by subscribing to any local internet provider for faster internet connection. However, this solution also means more money need to be spent. Thus, that is why we plan to use Open Wonderland in our research. With this 3-D MUVE, we can create a small virtual environment with less objects in it. We also can control the number of users who have access to our virtual world and make sure that the numbers are not too big. Therefore, our virtual world can be accessed smoothly by our students even with the standard internet speed of our faculty.

Last but not least, the next factors is about sensitive issues. Article written by Chen et al. (2011) has made us to take this matter seriously into our consideration. Most of the residents in Malaysia are Muslims, and we found
that some culture presented in Second Life are not suitable for our culture, especially to the students. For example, some of the avatars in Second Life are too sexy to watch. By using Open Wonderland, we can prevent this issue because the avatar only provided with normal or formal clothes for men and women, and its customization is also limited. Another sensitive issue that probably will arise while using Second Life, especially the free version of it is the interference, disturbances or harassments from other users to our students. In Second Life, they will meet lots of people from around the world with different backgrounds. If we look at the positive side, this provides an opportunity for them to know each other. However bear in mind that not all people is Second Life is good people. Some of them might be a bully, a rascal or someone who always swears and talks with inappropriate words. So we do not want our students to get involved with such people. Thus by utilizing Open Wonderland, we can restrict the access to our world. Only students of our own have the permission to enter the world. In other word, we can create a safe and secure environment for the students.

4. Conclusion

In conclusion, we can say that Open Wonderland is indeed a potential 3-D MUVE for teaching and learning. Because of that, we think it is better for us not to use Second Life and use Open Wonderland instead to conduct our learning sessions in our future research, although Second Life is the popular 3-D MUVE for teaching and learning that has been recognized by many educators. It is not because of Open Wonderland is better than Second Life, and we also did not mean to condemn Second Life as well, but it is due to the factors that have been discussed before. From our point of views, it is not a big problems to make use of Open Wonderland because from the previous literatures and also from our observations, most of the features provided by Second Life are also provided by Open Wonderland, but they are still quite different. Moreover in some circumstances, Open Wonderland can become the most suitable 3-D MUVE to conduct teaching and learning activities, just like our case. Hence, we recommend that any researchers who intend to do research in this field of study, but at the same time face the same problems like we do, just choose Open Wonderland as a 3-D MUVE for your research. Although it is still not mature enough as a tool for education, but Open Wonderland is a very promising 3-D MUVE.

References


