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Envisioning the Educational Possibilities of User-Created Virtual Worlds

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Educational games and simulations can engage students in higher-level cognitive thinking, such as interpreting, analyzing, discovering, evaluating, acting, and problem solving. Recent technical advances in multiplayer, user-created virtual worlds have significantly expanded the capabilities of user interaction and development within these simulated worlds. This ability to develop and interact with your own simulated world offers many new and exciting educational possibilities. This article explores the technical capabilities and educational potential of these new worlds. Additionally, it presents and illustrates a model, which uses interaction combinations, to identify course content and topics having educational applications in virtual worlds.

The EDUCAUSE National Learning Infrastructure Initiative (NLII) has identified games and simulations as an emerging key theme affecting teaching and learning.

Virtually all college students have had experience with games. Games represent active, immersive learning environments where users integrate information to solve a problem. Learning in this manner incorporates discovery, analysis, interpretation, and performance as well as physical and mental activity. An increasing number of

> colleges and universities are exploring the use of games to enhance learning. (EDUCAUSE-NLII, 2004, p. 28)

Recent technical advances in massively-multiplayer, user-created virtual worlds, such as Second Life, Active Worlds, and There, have made this technology both affordable and accessible. Additionally, these advances have expanded the capabilities of user interaction and development within these simulated worlds. Unlike most computer games, even multiplayer games, these virtual worlds allows the users to create their own world and interact with it and with other users in it, rather than simply interacting with an existing, preprogrammed world.

This ability to develop and interact with your own simulated world offers many new and exciting educational possibilities. With user-created virtual worlds, educators can create their own simulated worlds and have their students learn by exploring, interacting, and reflecting on their experiences in this world. Alternatively, students can actively apply course content and problem solve as they create and interact with their own worlds.

This article examines the educational possibilities of massively-multiplayer, user-created virtual worlds. It looks specifically at Second Life, a virtual world created by each user and simultaneously played by thousands of people around the world. It begins by briefly explaining and demonstrating some of the technical capabilities and uses of virtual worlds for teaching and learning. Most importantly, it introduces a vision mechanism to assist educators with identifying learning activities with potential application in a virtual world.

GAMES AS ACTIVE SOCIAL EXPERIENCE

You cannot be passive in a game or simulation. Students engaged in educational games and simulations are interpreting, analyzing, discovering, evaluating, acting, and problem solving. This approach to learning is very consistent with constructivist learning, where knowledge is constructed by the learners as they actively problem solve in an authentic context, as opposed to more traditional instruction where knowledge is seen as an object transmitted from teacher to learner (Jonassen & Land, 2000). This article uses a constructivist perspective as it examines the educational possibilities of virtual worlds.

In constructivist learning, collaboration is important, as knowledge is socially constructed. One common misconception of gaming is a solitary player, glued to his or her computer, and isolated from others. However, this is not the reality with modern computer games. Most games have a community of players who interact socially to discuss strategies, share experiences, and provide encouragement through websites, discussion boards, blogs, and wikis. Involvement in these gaming communities, called *meta-gaming*, can greatly improve a player's game performance and enjoyment.

Multiplayer games provide additional social experience within the game itself. In multiplayer games, several people can play the game at the same time using networking and Internet technologies. You can play the game with others, against others, or both. With massively multiplayer games, hundreds or even thousands of people can play at the same time.

This significantly changes the nature of a computer game. You are no longer playing in an *a priori* world, constrained and biased by the game developer. The actions of other people make the game open-ended and add complexity and unpredictability.

Several massively multiplayer games have evolved to provide even more user interaction and influence. In Second Life, users can create their own world. They can create complex objects, such as a house or motorcycle, by combining simpler objects, such as a cube or sphere. Additionally, objects can be programmed for action using a scripting language. The door on your house can open when you touch it, and you can race the motorcycle you designed and built.

Figure 1. Riding a user-created motorcycle

These capabilities take user-created virtual worlds beyond games, where players make moves and receive outcomes. They are worlds, created and inhabited by their users.

YOUR AVATAR

Given that background on educational games and simulations, this article now focuses on Second Life capabilities. At the center of many virtual games is your avatar, which is your physical representation in the game world. Your avatar can be customized to look as you would like him, her, or it to look. This includes: gender, height, skin color, facial features, hair style, clothing, and attachments such as wings or jewelry.

Figure 2. An avatar customized as a Celtic princess

While attending an event in Second Life, one author noticed all the other avatars at the event had black skin and since then he has met very few black avatars. In a world where we can be anyone and do just about anything, it is interesting that some kind of racial segregation or separation exists. What might people learn by changing racial or ethnic appearance in their Second Life? by changing gender in their Second Life?

Despite the open possibilities virtual worlds provide, we still remain constrained by our own real-life experiences and expectations. One author

kept a reflective journal as he played Second Life and has learned many things about his real life by reflecting on his Second Life experiences. Some things are just different enough in Second Life that they are noticed, though they remain hidden to us in real life. You and your students may have similar insights while reflecting on their virtual experiences.

MOVING AROUND

Your avatar can move around in Second Life. You can walk using the keyboard arrow keys. You also can fly, which is faster than walking. And, to quickly get to distant locations, events, and people, you can directly teleport, just like on Star Trek.

Figure 3. A flying avatar

Additionally, you can create custom animations for complex movements. This includes gestures such as laughing or pointing, poses for sitting or holding an object, and motions like running or dancing. This capability might provide an opportunity for students to explore the performing arts from alternative perspectives.

In their virtual journeys, the authors have met several people who are physically handicapped in real life. What might students with physical

disabilities do in Second Life, which would be difficult or impossible for them to do in real life? What would they learn about themselves and others if they could interact in a world where no one looked down on them because they were in a wheelchair and no one assumed they were mentally handicapped because they had physical challenges?

VISION MECHANISM

Although there are many other interesting technical capabilities of virtual worlds, this article is primarily interested in teaching and learning using virtual worlds. More than 700 educators from around the world currently use Second Life for education (Appel, 2006). Rather than describing specific educational applications, a framework exists for organizing these possibilities, which you can use to identify learning activities in your content area and connect those activities to potential applications of virtual worlds.

Basically, both virtual life and real life consist of people and objects, and these two things can interact in three possible combinations: person-person, person-object, and object-object (Antonacci & Modaress, 2005). Much of what we teach can be categorized into these interaction combinations. Once you identify a course topic falling into one of these combinations, you may have a topic which could be taught using a virtual world. The remainder of this article elaborates on these three interaction combinations and provides example video demonstrations to further illustrate educational possibilities for each combination.

PERSON-PERSON INTERACTION DEMONSTRATION: PATIENT EXAM ROLE-PLAY

For an example of person-person interaction, consider that doctors, nurses, and other medical professionals often interact with patients, and students in these professions need practice applying patient-encounter strategies. Role-playing is a common learning activity for this.

To demonstrate how virtual worlds can be used for role playing, we created our own virtual medical clinic. Although this demonstration could be used

in a number of ways, such as to illustrate effective strategies, we use it as a role-play scenario, where each student takes the part of the doctor, nurse, patient, or patient spouse. With this approach, students can see patient encounters from different perspectives, which would be difficult or impossible to do in real life. After the role play, students would discuss and reflect on their experience and its application to future patient encounters. To access the video demonstrating role-playing capabilities, go to http://www2.kumc.edu/ir/tlt/sl/SLPres-RolePlay.wmv.

Figure 4. Patient-exam role-playing demonstrating person-person interaction

In this video, please note the use of chat for communication, animations for gestures, medical clothing and equipment for a realistic setting, and wound texture applied to the patient's leg. Also, note that the actors during this demonstration were located in England, Denmark, Seattle, and Kansas City, but they were all virtually present in the clinic exam room!

In addition to medical education, many other fields require person-person interaction and would have similar educational applications for virtual worlds. In your field, do you teach students how to interact with other people: selling, interviewing, collaborating, or dealing with customer complaints? Would your students learn anything if they designed, built, and inhabited a medieval village? What if your students could participate in a holiday celebration with students from another country or culture?

PERSON-OBJECT DEMONSTRATION: MAKING A PARK

People also learn how to interact with objects, which includes designing and building objects. We teach people how to operate a piece of equipment or use an instrument. We teach people how to build homes, make jewelry, and create sculpture. A virtual world can provide a practice field where your students can apply concepts and principles in a realistic problem context.

In this demonstration, our student is given the problem of designing and building a park on donated land. To solve this problem, she must apply course content from her urban planning class or recreational studies course. After creating her park, she can describe what she did and explain her reasoning behind her decisions. And finally, the instructor and other students can walk through her park, evaluating it and offering suggestions for improvements. To access the video demonstrating building skills, go to http://www2.kumc.edu/ir/tlt/sl/SLPres-Build.wmv.

Figure 5. Building a virtual park demonstrating person-object interaction

In this video, our student creates a sidewalk from a thin rectangular block with a concrete texture. Then, she adds a bench, tree, and flowers from her inventory. Finally, she sits on the bench.

Do you teach courses where your students design and build things, such as engineering, architecture, interior design, fashion, art, and so forth? If so,

you might be able to use a virtual world to present a problem scenario and then have your students create their own virtual solutions.

Additionally, Second Life has an internal economy, which may provide an opportunity for your business students to run a real business, selling products or services to real people, not to a hard-coded computer simulation. Several radio stations exist in Second Life, and Second Life supports streaming video as well. These capabilities may offer real radio and television broadcasting and programming experience to your students.

OBJECT-OBJECT DEMONSTRATION: ORBITING SATELLITE

People learn how objects interact with other objects. For example, we teach students how mountains are formed when two tectonic plates collide, how hazardous chemicals get into our water supply, and how a car is built in an assembly line.

You can use virtual worlds to illustrate and explain physical and procedural processes. By creating objects and scripting them to interact with each other, you can simulate many processes. You also could have your students interact with your simulated process, changing variables and observing the results, to better understand the relationships among the objects. Or better yet, have your students create the simulation themselves. To access the video demonstrating satellite orbiting, go to http://www2.kumc.edu/ir/tlt/sl/SLPres-Orbit.wmv.

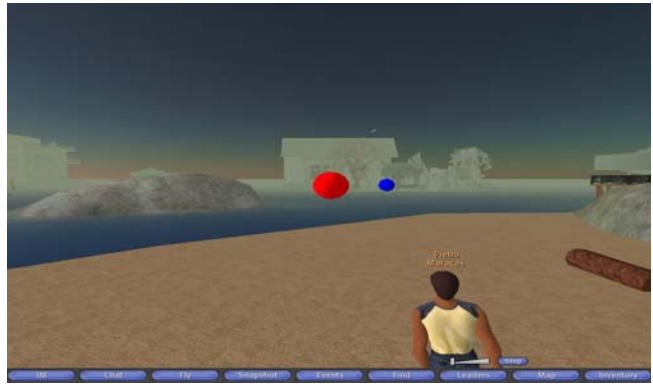

Figure 6. Orbiting satellite simulation demonstrating object-object interaction

In this video, note how satellite orbiting can be demonstrated and explained. With a more complex simulation, the velocity of the satellite projectile could be changed, so the satellite crashes into the planet or escapes from its gravitational field. Also, note how lighting provides an opportunity to better understand lunar phases.

GETTING STARTED

Faculty and students can begin using Second Life at no cost. You first sign up at http://www.secondlife.com to create a username and password. You will also need to choose your avatar, your persona in the virtual world, which can be modified later. Once you login with your username and password, your avatar will enter an Orientation Island where you will learn how to maneuver and communicate, but it may take several hours of in-world activity to master the essential features and controls.

There are different membership plans in Second Life. The basic membership is free and will allow you to attend events, shop, and even build objects where permitted. A premium account will allow you to own land where you can build anything imaginable. Premium accounts currently start at $9.95 a month and increase in cost if more land is owned. For large projects, you may want to purchase an entire private island, about 16 acres of virtual land. Educational subsidies and discounts are available through their Campus Life program.

To access Second Life, you will need a high-speed internet connection, Windows XP (Service Pack 2) or Windows 2000 (Service Pak 4), a computer processor of 800MHz Pentium III or Athlon or better with at least 256MB of computer memory. A Macintosh version is also available and requires at least Mac OS X 10.3.9, a 1 GHz G4 processor, and 512 MB of computer memory. Additionally, the following video/graphics cards are recommended:

- nVidia GeForce 2, GeForce 4mx, or better
- or ATI Radeon 8500, 9250, or better

Answers to questions or issues regarding Second Life, can be found either through the Second Life Knowledge Base (http://secondlife.com/knowledge-

base) or through their Official Blog (http://blog.secondlife.com). These pages are maintained by Linden Lab, the creators of Second Life, and include information on technical support and handy how-to guides.

POTENTIAL BARRIERS

Several barriers exist to using virtual worlds. First, they may have fairly high-end hardware and connectivity requirements, especially for an appropriate graphics card. Some aspects of virtual worlds, such as building and scripting, have steep learning curves, which reduce class time for learning course material.

Student encounters with other users can be problematic. Some student groups have upset other users by not fully disclosing the purpose of their visit and not obtaining consent from the other users before using information from their visit (Linden Lab, 2006). Also, because some virtual worlds are for adults only, some areas may have mature content and activities, which might be offensive to some students.

CLOSING

In this article, we wanted to help you begin envisioning the educational possibilities of this emerging technology. We also want to encourage you to explore massively-multiplayer, user-created virtual worlds, so you will be prepared to teach with this technology as it continues to mature.

Second Life is just one virtual world solution. Each virtual world will have advantages and disadvantages for a given context. It was selected because it is an inexpensive, readily-available, general purpose tool. Two similar virtual world are Active Worlds and There. Another alternative would be to license or develop a virtual world tool more focused on your instructional needs.

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