

Educational Frontiers:

Learning

in a

Virtual

World

Cynthia M. Calongne



“Lyr Lobo”

Virtual worlds are engaging, stimulating spaces where students can meet online for normal class activities, including lectures, discussions, case studies, projects, papers, exams, and labs. Classes are a mix of synchronous and asynchronous activity. A virtual world class differs from a traditional course management system, such as Blackboard or Moodle, due to the three-dimensional (3D) graphical setting, the use of avatars to represent the class participants, and the sense of presence that puts the learner within the scene.

Cynthia M. Calongne (“Lyr Lobo”) is Professor of Computer Science at Colorado Technical University.



Illustration by Dominic Bligatto, © 2008

Figure 1. From Second Life, a picture of Acheron LV426, an experimental-design class space hosted by the author and open to the public.



After teaching nine university courses using the virtual world of Second Life as an educational classroom, I have come to the conclusion that successful virtual class experiences require a blend of technology, tools, content, student ownership, identity, engagement, course structure, risk management, mentoring, feedback, and a good orientation to using the tool.

The First Class: Orientation

An editor once said that a published book often does not begin with the first chapter that the author wrote. Since authors tend to start the book with background and detailed information, the editor usually removed that chapter and began the book instead with chapter 2, where the action begins. Similarly, although it is tempting to begin a virtual worlds class with an orientation to the software and the virtual world itself, students need action and excitement to help them envision how they will use it effectively. Instructors thus should sell the benefits first, have students

choose to use the virtual world, and *then* discuss how it works.

When a student logs in to a virtual world for the first time, the monitor may display the student's avatar (a representation of self) from behind—that is, the student sees the back of his or her avatar. The world feels like a strange new frontier, populated with a scene (e.g., a landscape), 3D objects (e.g., billboards, boxes, benches), other avatars, and a user interface that would impress science fiction fans.

Figuring out how to move, look around, and interact with others is not intuitive for most users. If the first class begins here, some students will exit the software, vowing never to return. Rather than startle students, the first class needs to show them the benefits of using virtual

worlds, demonstrate what students of all ages have accomplished in only a few days, and provide a brief introduction on how to use the tool effectively. The first class should feature cool technology, exciting research, entertainment, and great visuals to enflame students' imagination.

I begin the orientation session with exciting examples from other classes, schools, and research projects. Putting a face on these experiences and making them real, personal, and engaging is important. Although I start most orientations on campus, online students also meet in the virtual world. Getting everyone to the class site requires a few minutes and benefits from alternative communication support (via phone, voice over IP, voice in the virtual world, or a conferencing tool).

Figuring out how to move, look around, and interact with others is not intuitive for most users. If the first class begins here, some students will exit the software, vowing never to return.



The next step is to mitigate the risks associated with using unfamiliar technology and to create a safe learning environment. Fear and uncertainty are barriers to learning.

I continue the orientation with highlights of accomplishments from teenage students at Ramapo, Suffern (N.Y.) Middle School's campus in Second Life, hosted by Peggy Sheehy (<http://ramapoislands.edublogs.org/about/>). Their learning experiences are inspiring and help my students visualize projects modeled in a virtual world. During one session, a student reflected: "If teens can do it, I can do it." Student ownership grows as students visualize the class workspace as a place where they meet, attend class sessions, work on projects, play, and relax with friends.

Finally, I end the orientation with an overview of how to move, look around, customize avatars, and interact with other avatars and objects. The instructions are simple and focus on basic skills. Students practice moving and looking around, laughing as they struggle to adapt the user interface to their perception of accepted behavior in both the real and the virtual worlds.

Overcoming Fear and Uncertainty: The Benefits for Students

At this point, some students may be eager to try out the virtual world, while others remain hesitant. The next step is thus to mitigate the risks associated with using unfamiliar technology and to create a safe learning environment. Fear and uncertainty are barriers to learning. Students worry that they are already challenged to learn a host of new concepts while acquiring the desired course competencies. Adding the complexity of a new software tool increases their perception of risk, and they need to see the benefits and how the instructor will manage the risks. Students need to know that it is OK to make mistakes and to explore the boundaries and that they are required to be active participants. After all, students learn best from their mistakes and rarely forget them, so one rule is that mistakes are great opportunities for learning.

Virtual world learning experiences are fun. Class can be held on the beach, in another country, in outer space, or in any simulated setting. Students do not need to be confined to a traditional class setting, with chairs facing forward, but can instead move within the learning environment, communicate via text or voice, offer information or ask questions whenever they like (without being impolite), and correspond with classmates and friends via private messaging.

Students can create content, using built-in tools to construct their ideas as a form of virtual doodling. These 3D objects and models can express their ideas and offer a context for questions as they work on class projects during class discussions.

The class experience is lively, engaging, and rich with social networks, interaction, and expression. Students are not passive. Their time spent is productive, allowing the instructor to provide feedback as they draft their ideas and conduct activities. Less time is spent in critical assessment at the end of the course, since the learning process and measurement instruments are interactive and observable throughout.

New roles emerge as students move from campus and online discussion boards to the virtual world classroom. Education centers on discovery, yet students often have a limited view of their role in the classroom. Some may be taking a class because it is required rather than because they chose it. A few may feel disengaged and go into "cruise control," expecting the instructor to entertain them. Shifting students from the passive roles of survivors and castaways to the active roles of researchers and explorers requires a change in their perception of themselves and their willingness to participate.

With very little time and a lot of content to cover, one way to accomplish this change is to use game-based metaphors that capture students' interest. But there

is no need to actually create a game to leverage the concept of game-play for class activities. After all, class activities come with goals, feedback, rewards, and recognition, and these translate well in this visual, exploratory environment. The virtual world looks like a game setting and is one in which instructors can guide, observe, and provide feedback and rewards for class activities.

Students worry that the class structure will be poorly defined and managed. A well-structured course includes a syllabus that defines the course objectives, learning objectives, goals, measurements, a schedule of activities and assignments, and rubrics for assessment. Virtual world courses add information on how projects will be delivered, how class discussions will be evaluated, and how students can benefit from feedback to improve the quality of their work throughout the course.

Other benefits include discovering new ways to study, discuss, create, and express the course subject under the supervision and support of the instructor. In virtual worlds, the instructor's role shifts from being the "sage on the stage" to being the domain expert—the authority who stimulates and supervises exploration while providing structure, guidance, feedback, and assessment. Demystifying complexity is not an easy task!

Great virtual world learning experiences blend the following features in a mix that is appropriate for the course content and for the achievement of the desired course competencies. Not all classes include projects or creation of 3D content, and this list favors activity-based learning and social networks:

- *Self*: Customizing the avatar
- *Exploration*: Moving around the world
- *Communication*: Sharing information with others
- *Navigation*: Looking at 3D content
- *Interaction*: Using 3D objects
- *Creation*: Designing a class project

Since a student's understanding of complex content may be hazy, offering information in a variety of ways allows students to use the information to solve problems and create solutions for their projects.

- *Delivery:* Giving the projects to the instructor
- *Assessment:* Evaluating Second Life projects
- *Feedback:* Compiling progress and performance reports

Content That Comes to Life

Virtual world classrooms use a mix of media-rich course materials. Aside from how content is shared via discussion during synchronous sessions, learning stations can be designed that offer content to students who miss class or who need more time to study and reflect. Students can touch these 3D objects to get notecards, listen to podcasts, or see streaming video that covers this course content. Al-

though this capability is also available in online course management systems and websites, the shared nature of an avatar interacting with an object, being part of the content that is being studied, and seeing 3D simulations of the content come to life is powerful. Since a student's understanding of complex content may be hazy, offering information in a variety of ways allows students to use the information to solve problems and create solutions for their projects.

Exams or assessments of competency shift to projects and solutions to problems that are expressed in context, offering new ways to visualize, experience, and assess the solutions. This method does not replace traditional methods

of evaluation, but it does offer additional ways of assessing what students know and can apply. For example, CS 382, a software design class at Colorado Technical University (CTU), created a 3D game maze and populated it with traps, sensors, flags, a scoreboard, treasures, and other game features and then played the game on the last night of class. The goal of the class was to learn to model a variety of software designs using drawings in a design specification. The students exceeded the class requirements: they designed, prototyped, and tested their designs. They discovered a minor flaw, and one student fixed the problem while the class tested it during the next run of the game.

These students were so immersed in the learning experience that they did not realize they had accomplished the goals of several classes in a single term. Virtual environments are stimulating, creative

FIGURE 2. From *Second Life*, students role-play a courtroom scene in Ramapo, Suffern (N.Y.) Middle School's virtual world campus hosted by Peggy Sheehy in Teen *Second Life* (http://ramapoislands.blogspot.com/2007_02_01_archive.html and <http://ramapoislands.edublogs.org/>).



landscapes. When virtual worlds are populated with the right mix of content and discovery, students remain long after class ends.

Location, Identity, and Roles: How Virtual Are They?

Virtual world classrooms are no less real than other online class environments, and if used for synchronous class sessions, they may simulate a campus-based class meeting. The differences are the emphasis on interaction, real-time discussion, and shared experiences and the addition of back-channel communication features, such as instant messaging to individuals, the entire class, and other virtual world groups.

Class participants are often not anonymous, despite the use of virtual world aliases for avatar names. One reason is that students want information, education, feedback, and grades from their instructor, and they want to know who is responding to them. In addition, students share a sense of community in these environments, and they mentor one another as they discover how to use the tool to complete their individual and team course activities. This sense of identity differs from the social use of vir-

tual worlds for entertainment purposes, where anonymity is often favored.

Finally, as students become active participants in virtual world classes, the student who is on “cruise control” is at risk. Students shift from being passive listeners to engaging in group interaction and activities and demonstrating that they understand the course content via the completion of projects, papers, labs, and case studies. Many classes that include case studies use role-play, putting learners in roles and contexts in which

FIGURE 3. From *Second Life*, a picture of the author and a student discussing accessibility design.



they explore the content and make decisions based on the forces and constraints placed on them. One example of a class role-play is shown in Figure 2, which depicts Ramapo's immersive literature activity in which Suffern Middle School students enact the courtroom scene from John Steinbeck's *Of Mice and Men*. The students' exploration of the content benefits from this social learning environment.

Class in a Virtual World: A Case Study

During early 2008, a “Usability and Interaction” class at CTU (CS 820) used *Second Life* to conduct all of its online class sessions. During the course of the class, the students met weekly to discuss the class concepts. They learned basic virtual world building and texturing skills, developed user-interface prototypes, designed usability experiments, and conducted usability evaluations within *Second Life*.

The virtual world classroom became an open space version of a usability lab. In this virtual usability lab, students needed to first learn how to use the virtual world building tool to construct objects, texture them, and link them to create user-interface prototypes and heads-up display prototypes.

The students noted that the virtual world classes enhanced their learning experience and their perceptions of self and gave them new skills to demonstrate their mastery of the course content.

In addition to learning user-interface design and testing principles, the class goal was to reflect on new ways to design and evaluate user interfaces. With this goal in mind, the students elected to study problems related to accessibility, perception, and interaction. Instead of focusing solely on the software interfaces, they created 3D linked objects with behaviors that simulated real-world systems.

In their “lessons learned” papers, the students noted that the virtual world classes enhanced their learning experience and their perceptions of self and gave them new skills to demonstrate their mastery of the course content. The sense of presence and the customization

of their avatars were high on their list of priorities for learning and participating in virtual world classes. In contrast, they noted that it took time for them to customize their avatars and to learn to communicate, gesture, and emote. They also learned to create 3D objects and to texture, link, and program the objects into testable, scripted projects that responded when touched.

As mentor, I felt it was important that I offer the right mix of instruction, observation, opportunity to struggle, and support—all of which were necessary for them to discover, build, and test their solutions. The struggle to discover solutions is part of the learning process. For the mentor, knowing how to balance

that struggle with solutions and success is key.

The user-interface projects studied accessibility issues, evaluated them with test subjects, and analyzed how virtual

environments enhanced or detracted from the simulation of these real-world experiences. At the conclusion of the class, students exceeded the course requirements and learned a host of virtual world skills.

Virtual Worlds, Enhanced Learning

Do virtual world classes replace campus-based classes or online course management systems? No. Campus-based classes offer rich interaction, expression, and other forms of communication and real-world experiences that are not possible given today’s virtual world technology. For classes that center on formal papers and research reports, campus-based and online classes excel.



Course designers, instructors, and IT professionals are challenged to create stimulating content, deliver it reliably, and ensure a stable virtual world learning environment.

Even though slides and text-based information can be used in the virtual world, its strengths center on 3D visualization and sensory experiences that are harder to simulate in the campus-based and online classrooms.

The use of virtual worlds expands on the campus-based and online classrooms, enhancing learning experiences. Classes in virtual worlds offer opportunities for visualization, simulation, enhanced social networks, and shared learning experiences. Some people learn best by listening to the course content, others by seeing and visualizing the content in context, and the rest by using a hands-on approach

to demonstrate course competencies. In virtual worlds, we can leverage a mix of content and activity to support all learners: auditory, visual, and kinesthetic.

Virtual worlds support these different learning styles and give students opportunities to explore, discover, and express their understanding of the subject. Naturally, the tool's capabilities do not guarantee a great learning experience. The success of a course depends on effective course design, delivery, and assessment. Course designers, instructors, and IT professionals are challenged to create stimulating content, deliver it reliably, and ensure a stable virtual world learning environment.

Do the benefits outweigh the risks associated with venturing into a virtual world educational platform? For me, the virtual world is my preferred learning and teaching environment. And I am not alone. Over 400 universities and 4,500 educators participate on the Second Life Educators List (SLED).¹ All of us are studying how to leverage the benefits of learning in a virtual world in order to assist our students in today's educational frontiers. *e*

Note

1. For more on the SLED list, see <<https://lists.secondlife.com/cgi-bin/mailman/listinfo/educators>> and <<http://www.sl-educationblog.org/?p=91>>.