



THE DESKTOP VIRTUAL REALITY GALLERY: SHARING STUDENT ENVIRONMENTS ONLINE

David C. Vinciguerra

East Carolina University
Greenville, USA
vinciguerrad@mail.ecu.edu

Summary

David Vinciguerra is coordinator of the Virtual Reality and Education Laboratory and instructor in virtual reality at the College of Education at East Carolina University, Greenville, USA.

He teaches all his courses completely online, including *Introduction to Virtual Reality* and *Virtual Reality in Education*.

David also serves as an instructional design consultant for the Department of Librarianship, Educational Technology and Distance Instruction.

His research interests include the design and use of collaborative virtual environments and he utilizes online multimedia communication technologies in the teaching of graphic-intensive courses online.

One of the initial curiosities many students express when enrolling in an online introductory virtual reality course is what exactly a virtual environment consists of.

Course descriptions can be ambiguous when simply stating that the student will design a virtual environment. Without seeing examples of virtual environments, many students can be puzzled as to what this statement exactly means.

This unknown can often lead the student to fear that they will not have the skills or knowledge required to complete this task. By providing examples in which students can view the works of former and current class participants, the virtual environment gallery allows students to view and interact with virtual worlds designed by their peers.

By creating the online virtual environment gallery, the motivation and quality of student work improved, student involvement and communication increased, and students were more inspired to learn how to create virtual worlds and share their virtual environments with others.

Introduction

An aspect that, until now, has been absent from the online introductory virtual reality courses at East Carolina University, is a convenient means for students to view the work of their fellow classmates. Since participants in these courses do not meet face-to-face, presenting the virtual environments created by students to their classmates in a classroom is not a possibility.

The option for students to view the virtual environments of their classmates and previous students had been requested for some time now and efforts towards sharing were attempted several years ago, but software limitations and personal computer resources were not adequate for making this effective. However, with recent advancements in technology and Internet capabilities, an online virtual environment gallery has become possible. What was once a hopeful future state of technology is now commonplace.

Ten years ago technologists began theorizing as to what networking technology would exist in the future. In *Garage Virtual Reality*, Linda Jacobson discusses the possible future of virtual environments. "Some day, affordable reality engines, interconnected through phone lines over a network, will provide access to multi-sensory three-dimensional virtual worlds, which large bands of explorers will enter and manipulate, all interacting with the same single, shared environment at one time.". Jacobson further explains how, "Before networked VR can enter the home or hit the desktop, we'll need a wide-area network infrastructure and a telecommunications protocol that works long distance over standard phone lines . (Jacobson, 1994).

With the Internet serving as a wide-area network and high speed Internet connectivity now available in the home, this once hopeful outlook of the future exists now. The addition of a gallery to these introductory virtual reality courses to which students can contribute and view on their home personal computers, has finally become possible.

What has been dubbed 'desktop VR' has been the biggest factor in making this possible. Desktop VR does not have the same technological demands as immersive VR. Students can participate in virtual environments using their personal computers and construct virtual worlds without having to purchase costly equipment or software.

The Introduction to Virtual Reality course focuses on the basic applications of virtual reality in education and other fields. Since this is an ever changing, constantly evolving field, it is imperative that it be taught by a means in which current information is continually being infused into the course content.

Delivering course content via the Internet solves this problem by providing students with a wealth of resources, ensuring that the course is up-to-date with current trends in technology and course related information. "Online delivery has been found to be an effective method of teaching with multiple links to World Wide Web sites ensuring that each student has access to an abundant, in-depth array of virtual-reality resources, the quality and depth of which could not be matched if only printed materials were used." (Pantelidis & Auld, 2003)

Because it is an introductory course, the core content examines what virtual reality is, how it is currently used and what applications virtual reality is appropriate for. The course instructs students on how to evaluate virtual reality hardware and software. Building a virtual environment incorporates these evaluations in a practical setting. By designing a virtual environment, students are exposed to

virtual reality software and hardware which allows them to understand the pros and cons of different software programs. This enables them to make educated decisions on what software and hardware should be purchased, depending on the needs of a given project. Incorporating the Internet in this way ensures that students have access to the most current software, reviews, hardware information and resources.

One of the initial curiosities many students express when enrolling in an online introductory virtual reality course is what exactly a virtual environment consists of. Course descriptions can be ambiguous when simply stating that the student will design a virtual environment. Without seeing examples of virtual environments, many students can be puzzled as to what this statement exactly means. This unknown can often lead the student to fear that they will not have the skills or knowledge required to complete this task. By providing examples in which students can view the works of former and current class participants, the virtual environment gallery allows students to view and interact with virtual worlds designed by their peers.

Knowing that previous learners had also entered the course with no virtual reality experience, yet had successfully completed these tasks, can build confidence in a student. No longer is the thought of designing a virtual environment intimidating, rather, it is very possible and even exciting.

Knowing that their peers used VRML¹ software to create a world, without even knowing what VRML was when they began the course, suggests to them the accurate impression that designing a VRML environment may not consist of hours of designing or typing in complex computer codes, but may, in fact, be easy to do and enjoyable.

VRML is extremely easy to use to explore virtual worlds on the Internet. VRML is also relatively easy to use to create virtual worlds of one's own as well. While using VRML to create virtual worlds is not quite painless, there exist tools and techniques to make the process relatively easy and quick. In fact, the tools available for VRML make it easier to create a home world than a home page in many cases. (Goralski et al, 1997)

The online virtual environment gallery that has been developed for the VR classes consists of a website containing a menu that links to the various projects. Each menu option contains a screen shot of the virtual environment, as well as information about it. Selecting the project image launches the virtual environment. Information listed for each environment is:

- name of the virtual environment;
- designer (usually a current or former student);
- a brief description of the environment and its intended purpose;
- the VR software used to design it;
- the file type;
- any plug-ins needed to run the environment; and
- the file size of the download

¹ VRML (Virtual Reality Modelling Language), which is often pronounced as vermal, is the standard file format for virtual environments designed to be viewed on the world wide web. A web browser reads the VRML text code and translates it into the 3-Dimensional images viewed by a user, much like the way a web browsers translate the HTML code of a typical webpage into the text and graphics presented on a webpage.

Personal information is optional for the student submitting his/her work to the online gallery. Should a student wish their work to be showcased, but desire to remain anonymous, their name will not be printed.

After the creation and integration of the online virtual environment gallery into an online web-based introductory virtual reality course, a survey was distributed to the students to get their opinions about the gallery and allow them to contribute suggestions. As an introductory course, there was a wide range in the complexities of the projects received.

Some projects submitted contained very complex and detailed structures and layouts, while others, although very effective, had been relatively simple. Initially there was the fear that some students, upon viewing the completed works of previous class participants, would be discouraged when comparing their skills to others. This fear, however, was quickly dispelled by the positive responses from the student survey results. Not only did students find the gallery inspiring and helpful when planning and designing their own projects, but several unexpected benefits resulted from the introduction of the gallery as well.

One truly unpredicted result of the virtual gallery arose when students found it to be a great opportunity to showcase their work. This desire to allow others to view their environments resulted in increased student performance and motivation. Knowing that their work may be seen by their fellow classmates prompted many of them to create very elaborate virtual environments.

Somehow, the goal to create a virtual environment good enough to be showcased on the virtual gallery site developed in the minds of some of the students. No longer were students simply turning in an assignment to their instructor, they now had an exciting goal for themselves and a sense of competition. The virtual environment gallery was created not to inspire competition amongst students, but simply to show examples of virtual worlds and demonstrations of software capabilities. This unanticipated motivating force developed completely among the students themselves.

Another unexpected benefit of the online virtual environment gallery was the initiation of communication between and among students. Since these particular virtual reality courses are offered completely online, face-to-face communication between students is not usual. Students traditionally communicate solely with their professor via e-mail and rarely write or meet with their classmates to discuss course-relevant topics.

This trend, however, began to change quickly as student environments began to be added to the online virtual gallery. Students began writing to one another to discuss each other's environments. They began asking each other how they completed particular parts of their environment and/or what programs they used to construct their environments.

The virtual gallery became a great benefit also to instructors by providing them with a portfolio of student work to show to potential students, to display at conferences and to provide evidence that students were meeting their objectives.

Student virtual environments can also be a great resource to course advisors. Showing the work that an actual student has done, on a course flyer, allows potential students to view an accurate depiction of what is being done by their peers. This obviates the need to have access to a computer or having to gain access to the course page should it be password protected as many online courses

are. After receiving student permission to use their work, this flyer can then be send to advisors to post.

The choice was made in this particular course to password protect the online virtual environment gallery so that only virtual reality students could view the projects to protect the students' work. This choice was, perhaps, arbitrary, and a free access gallery would allow for obvious additional benefits to students and instructors, but with less security. In either case, student permission to display their work should be requested and approved in writing. Figure 1 shows an example of how a screen shot from a student's virtual environment can be used on a course advertising flyer.



Figure 1: Screen shot from a student's virtual environment

The primary *complaint*, in which students requested that more virtual environments be added to the gallery, is more of a compliment to the gallery than dissatisfaction. At the time the survey was completed there were ten different virtual environments incorporated into the gallery. These projects were designed by students from several different majors and backgrounds, using various programs and portraying multiple subjects. These subjects ranged from educational buildings and historical structures, to imaginary worlds and abstract environments. In addition, multiple VR formats such as virtual walkthroughs, avatar² point-of-view layouts and VR movies were incorporated.

Other suggestions relating to the improvement of the online virtual gallery involve setting up automatic installations of plug-ins when users click on the selected virtual environments, navigation instructions, since different programs utilize

² An avatar is a computer generated visual representation of an individual in a virtual environment. The user interacts with a virtual world by navigating their avatar within the environment.

different navigation schemes, and quicker download times for walkthrough environments as well as VR movies.

This final request, referring to download times involving walkthrough environments, online videos, images, and other graphic forms, is a common concern of any online virtual reality course. When teaching a graphics-based course, the decisions as to how to incorporate graphical images into the course work is examined, especially because of download times.

Pantelidis & Auld, (2002), Co-Directors of the Virtual Reality Education Laboratory at East Carolina University, devised an online technique that allowed users to choose what graphic images to view and when. They put in hyperlinks to relevant websites that illustrated the VR hardware, software, and principles they were trying to teach. Providing these links for the distance learner to follow allowed the learner to construct their own knowledge base and follow the links that interested them most.

This same technique is applied to the virtual reality environment gallery, allowing users to view the environments that interest them and allowing them to view these worlds at a time and place that is convenient for them. Plans to implement the changes recommended by the current students, using the techniques described by Pantelidis and Auld, are hoped to make the gallery even more effective in conveying information to future students.

Conclusion

Overall, the online virtual gallery is a great success. Students have even mentioned that having examples created by former students like this in other technology related courses would assist them in project design and creation.

By creating the online virtual environment gallery, the motivation and quality of student work has improved, student involvement and communication has increased, and students are more inspired to learn how to create virtual worlds and share their virtual environments with others.

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