Carleton Virtual – Using virtual space as an environment for student learning at Carleton University

Opportunity

Carleton Virtual (CV) is an online 3D virtual environment that resembles the physical Carleton University campus in Ottawa. CV was built to explore how the unique qualities of virtual environments can best enhance student experience and learning. CV began in the Carleton School of Information Technology from an interest in gaming and how its 3D virtual technology and structure might be used for learning.

Three-dimensional virtual environments are graphical environments in which users control computer-generated characters, called avatars, which represent them. The avatars move around the virtual space and interact with the environment and with the avatars representing other users and sometimes with other characters which are controlled by the computer.

The company Avaya bought the web.alive technology to build 3D environments online from Nortel and wanted to explore its application to education and health. Carleton University partners with Avaya to develop the environments and research how virtual environments can contribute to student learning by providing an electronic surrogate for face-to-face interaction and creating simulated environments and experiences that could not otherwise be available – due to cost, geographic, logistic, safety, and other constraints.

Innovation

By signing in to Carleton Virtual, a student can visit online virtual representations of the buildings, classrooms, hallways, meeting rooms, and other spaces at Carleton University. The virtual spaces can be used for lectures, presentations, social interactions, and special activities and have screens that can be used to show, access, and update content in the environment. Using the framework of Carleton Virtual, two faculty members built prototypes to research the effective use of virtual space to provide students with unique experiences for active learning. One application is related to archaeology, the other to language learning.

A classroom in Carleton Virtual

Archaeology: Professor Shawn Graham wanted his students to understand that the context in which an object is found is crucial in an archaeological site but he could not take them to a real site. A virtual site was constructed based on one of his previous excavations to test whether the use of a virtual environment would help students in understanding how archaeological knowledge is created and to help the educators research how virtual environments can encourage student engagement for improved learning. The students were given tools with which to record their understanding of the site and what it represents. They also responded to a post-task questionnaire.
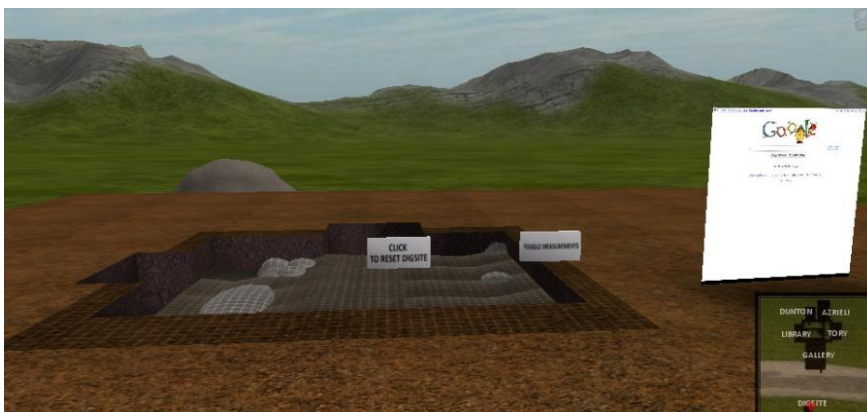
The virtual archaeological site

Language: Peggy Hartwick in the School of Linguistics and Applied Languages wanted to create a framework for language learning through a virtual meeting space in which English-as-a-second-language students could practice speaking and collaborating with their classmates in a risk-free environment. The students were introduced to the virtual environment and asked to express their apprehensions. They then had a choice of a traditional or a virtual group research project and presentation. The students who chose the virtual assignment were required to meet, collaborate, and present exclusively in Carleton Virtual. They could work from anywhere and meet in the virtual library rooms where the same technologies, such as collaborative work surfaces, were

available to them as to traditional students; the final presentation was made in a virtual classroom.

Outcomes and Benefits

Archaeology: According to the student assessments, the virtual learning was stimulating, helped understanding, and the simulation revealed useful information. The developers saw that a focus on student engagement seemed to promote the type of learning they were seeking.

Language: Student feedback was generally positive as they found the learning experience to be active and linked to their generation's ease with technology. They also enjoyed personalizing their avatars and this led to discussion and humour – practicing their language skills. The instructor noted a high level of enthusiasm and task engagement, with some learners appearing less reticent about speaking and demonstrating more initiative and problem-solving skills in the virtual environment than they do in more traditional assignments. The freedom, autonomy, and anonymity of the virtual space produced more of a risk-free environment for language practice than a regular classroom.

These applications were conceived by the project team as research into the use of virtual space as a framework for learning; for them the results indicate that virtual space:

- Allows learners in different locations to interact and collaborate for learning;
- Gives learners access to educational facilities that would not normally be available;
- Enables educational activities that are not possible in physical settings; and
- Offers researchers a variety of observation and evaluation tools for student performance evaluation and improvement.

Challenges and Enhancements

Virtual environments are new in the world of learning; they are complex and costly to build and require high-end technology and Internet speed. Research and development are still needed on how to make the educational environments realistic, flexible, complete, and easy to use.

The learning curve for instructors and learners can be steep, requiring training and support as they become accustomed to the demands and possibilities in Carleton Virtual. The multidisciplinary project team is studying factors in adoption and usability.

The students who used CV in the language project reported challenges in technology and Internet access, a lack of privacy in the open CV environment, and concerns with the lack of eye contact and body language.

Published research on effective use of virtual environments in post-secondary education is limited and there is a need to know more about how a virtual world can fit into what is being learned and what its specific contributions might be. Carleton Virtual, as it moves from a research project to implementation, continues to explore these questions.

Potential

Project members at Carleton are very open to discussing their virtual environment and its applications to student learning with other post-secondary institutions in Ontario. Professor Ali Arya, in the Carleton School of Information Technology and the lead faculty member on Carleton Virtual, outlined three key areas of potential collaborative development:

- As more exploration is done on how virtual environments can benefit learners, other post-secondary educational institutions in Ontario may want to use the Carleton Virtual environment to test or to run their applications.

- Graduates and students who have worked with Carleton Virtual can help other institutions to build their own environments.

- Post-secondary institutions can work together on research to advance the functionality and educational applications of the system.

Further Information

Patrick Lyons
Director, Instructional Technologies
Carleton University, Ottawa
patrick_lyons@carleton.ca

Ali Arya
Associate Professor
Carleton School of Information Technology &
Department of Systems and Computer Engineering
Carleton University, Ottawa
arya@carleton.ca

http://img.csit.carleton.ca/vcu/
http://img.csit.carleton.ca/vcher/

Arya, Ali, Peggy Hartwick, Shawn Graham, and Nuket Nowlan. *Virtual space as a learning environment: Two case studies.*
http://img.csit.carleton.ca/vcher/CarletonVirtual.pdf