Title: Utilizing Immersive Visualization Systems: How to dynamically revolutionize site-based professional development experiences within human resources management?

Author Name: Kirby A. Craft, Jackson State University

Publication Date: July 23, 2009

Abstract

How can we train today's workforce with innovative technologies when families are surrounded by state-of-the-art video games and high-definition televisions? Human resource managers and administrators are faced with difficult challenges to prepare beneficial and relevant professional development exercises that engage the minds of their employees. The more technologically savvy these activities are, the more likely today's young people will fully embrace and buy into management programs. This article focuses on utilizing today's technology to allow teachers and staff members to experience a new dynamic learning experience that capitalizes upon auditory, kinesthetic, and visual learning styles.

Utilizing Immersive Visualization Systems: How to dynamically revolutionize site-based professional development experiences within human resources management?

"Computer, load Bridge Officer's Test, program Engineering Qualification Section One," said the ship counselor of the USS Enterprise in the hit television series, *Star Trek: The Next Generation* (Hatton & Kolbe, 1994). Set in futuristic 2364, this command from Troi directs the computer to materialize life-sized buildings, humans, animals, and plants in a cube-shaped room, called the holodeck. Throughout the series, crewmembers utilize the holodeck for luxurious vacations, training missions, and daredevil stunts, all which are interactive. This technology even has built in safety thresholds that restrict pain to tolerable levels and protect the users from serious or fatal injuries. Once initiating a program, all traces of the real world disappear until the user calls upon the computer to end the program.

I thought as a ten-year-old boy that this technology was amazing. Anything I imaged, I could have; anywhere I wanted to go, I could visit; anyone I wanted to meet, I could encounter. The only caveat was that I would have to experience it on the holodeck. Imagine the possibilities. Little did I know that the foundation for this technology would be created just a few short years after the first episode of *Star Trek: The Next* Generation aired on national television.

In the labs of the University of Illinois in 1992 (Rush, 2006), engineers designed the first system that would allow multiple users to enter a world completely immersed in images and sounds. Known as the CAVE or Cave Automatic Virtual Environment, this technology has become the primary immersive visualization system used throughout the world (Mechdyne, 2008). While we are still years away from materializing matter for a 3-dimensional world, this

system bridged a gap between television fiction and world reality by allowing multiple users to visualize the same images at the same time in the same virtual world.

According to the University of Michigan ("Virtual reality," 2008), the heart of the CAVE system rests in projecting an image on four to six sides of a cube-shaped room and utilizing sensors to detect a user's movements. Often, these sensors are located in the center of the ceiling and in hand-held control devices such as wands or gloves. Powerful computers process the data and replicate the user's movements allowing the user to modify and interact with the virtual environment. The significant key to producing a 3-dimensional image is with special shutter LCD glasses that alternatively block sight giving the user an illusion of standing in a virtual world.

As a young child, I imagined possibilities; today, I see great opportunities. Regardless of one's profession, utilizing a virtual environment would allow every conceivable situation to be simulated and rehearsed until mastered. We could revolutionize the professional development of every organization in the world and provide realistic training without the risk of catastrophic failure.

A number of business and educational identities already utilize the CAVE system for research and educational training. At Iowa State University, some architecture professors have used the CAVE to develop models of large cities to assist with the development of urban growth ("The most realistic," 2006). Furthermore, in a recent partnership between the US Department of Defense and Iowa State University, the military funded an upgrade to the existing CAVE that allows for faster, more accurate calculations. The Air Force is currently utilizing the system to design and tests unmanned flying vehicles.

Other educational institutions are also utilizing CAVE technology to enhance the learning environment. At Rice University in Houston, Texas, they train medical doctors in the proper technique for surgery through virtual reality simulations ("Virtual reality," 2008). Each of these universities has embraced this technology to enhance learning and reduce the chance of failure in the medical world.

As educators, this is our job—to reduce the rate of failures to zero. We must strive to make the community better; however, teachers often work and operate as isolated islands instead of collegial partners (Barth, 1990). If our schools are to become successful learning communities, teachers must do what is necessary to ensure everyone's success (Sergiovanni, 1992). Traditionally, this has occurred through mentoring sessions or discussions in the teacher lounges; however, what if we could utilize CAVE systems? All of a sudden, we would transform faculty meetings into vibrant and engaging learning centers. Situations that could never be duplicated in real life could be enacted and rehearsed by all personnel.

Appropriate training exercises always benefit our teachers by preparing them for the future, whether that is expected or unknown. As we enhance the learning processes for our teachers, we typically enhance the learning process for our students. According to Sims (2002), Sergiovanni believes that people can develop significant and moral deductions when provided appropriate experiences. When these inferences are valued by the teacher, they take ownership and are much more likely to implement the elements of the training in their classrooms.

Virtual environments offer one option to train teachers in classroom management, instructional practices, and disaster scenarios. By utilizing multiple senses, this system targets the auditory, kinesthetic, and visual learners increasing the chances that learning occurs. This

system, however, is not a one-size-fits-all solution for professional development; it is simply an instrument in a diversified toolbox that administrators can access to enhance education.

Former U.S. Secretary of Health and Human Services, Michael Leavitt, said, "Our goal as a nation should be to make sure that every young person becomes a productive adult and responsible citizen" (U.S. Department of Education, 2008). In today's high-speed, technologically advanced world, we will never reach every student until our classrooms reflect a 21st century educational system. The CAVE goes beyond this traditional instruction; it literally brings the world to your fingertips, just visually. As we bridge the educational chalkboard of yesterday with the virtual world of today, we create a new and vibrant educational experience for both our teachers and students.

Every administrator and teacher starts the first day of school filled with hopes of a great year. For there to be success in any venture, hope is required; however, structures must exist to facilitate wishful thinking into action. This responsibility requires the administration to provide a context for all stakeholders to realize their full potential (Sergiovanni, 2004). By utilizing the CAVE system, educators can test their fears, doubts, insecurities, and new teaching strategies in a safe learning environment under the supervision of an expert teacher and administrator. Teachers receive instant feedback while principals conduct exceptional professional development, a win-win for all.

While virtual environments offer exceptional professional development experiences for adults, their use in the classroom is just as significant for the students. When a history teacher discusses the Great Wall of China or the Grand Canyon, the entire class can take a virtual 3-dimensional trip across the world. A math teacher could illustrate the importance of geometric shapes by examining the Eiffel Tower, Sydney Opera House, or the Gateway Arch. I can

imagine the students in both of these classes engaged, excited, and learning. Parents and teachers desire for students to develop a love for learning, critical thinking skills, and the ability to solve problems (Sergiovanni, 1984). As we expand the minds of our children through these new virtual technologies, such as the CAVE, our students gain the skills necessary to not only become successful and productive citizens, but partners in an increasingly global economy.

If this technology is so great, why do we not see virtual reality systems throughout the educational system? Cost. The only hindrance preventing this technology from reaching a child tomorrow is the cost today; owning 21st century technology comes at a 21st century price. In a research study conducted by students at Pennsylvania State University in 1999, a basic CAVE system costs over $400,000 (SimTech, 1999). More advanced units can range upwards of $4 million ("The most realistic," 2006). With these prices composing entire school budgets, it is evident why few schools and businesses are able to afford the luxury of this technology.

Other technologies do exist that simulate a 3-dimensional world, such as virtual reality headsets; however, unlike the CAVE, they do not allow the user to fully immerge themselves into the environment or physically interact with other staff members. At a fraction of the costs of fully immersive systems, basic virtual reality gear offers many of the same benefits, just on a more individualized basis.

As our world becomes more technology advanced, we can expect so see more immersive visualization systems. The key will be to utilize them to revolutionize professional development for our faculty and staff while enhancing the skills and exposure of the community at large. While we have come a long way with the technologies of virtual reality, we have years ahead us before we can command computers to load "Bridge Officer" training programs on a holodeck.

Until then, we must utilize every available technology and as time passes, CAVE systems will be as common place in homes as the color television.

References

Barth, Roland. 1990. *Improving Schools from Within,* San Francisco, CA: Jossey-Bass.

Hatton, Christopher (Writer), & Kolbe, Rick (Director). (1994). Thine own self. [Television series episode]. Moore, Ronald (Teleplay), *Star Trek: The Next Generation.* Hollywood, CA: Paramount Pictures Corporation.

Mechdyne. (2008). CAVE automatic virtual environment. [Brochure]. Marshalltown, IA: Author.

Rush, Michael. (2006, January 8). *In love with reality truly, madly, virtually*. New York Times. Retrieved July 20, 2009, from http://www.nytimes.com.

Sergiovanni, Thomas J. (1984). Leadership and excellence in schooling. *Educational Leadership, 41(5),* 4-14.

Sergiovanni, Thomas J. (1992). Why we should seek substitutes for leadership. *Educational Leadership, 49(5),* 41-45.

Sergiovanni, Thomas J. (2004). Building a community of hope. *Educational Leadership, 61(8),* 33-37.

Sims, Carolyn. (2002). *Sergiovanni, synodical schools, and servant leadership.* Lutheran Education, 138, *95 – 99.*

SimTech. (1999). *Virtual Reality Simulator Proposal for the DD-70 Vibratory Asphalt Compactor*. [Data file]. Available from Pennsylvania State University Web site, http://www.psu.edu/

"The most realistic virtual reality room in the world." (2006). Retrieved June 25, 2009, from Iowa State University, News Service Web site: http://www.public.iastate.edu/~nscentral/news/2006/may/c6update.shtml

U.S. Department of Education, Office of Vocational and Adult Education. (2008) *Bridges to Opportunity: Federal Adult Education Programs for the 21st Century, Report to the President on Executive Order 13445*. Washington, D.C.

"Virtual reality CAVE." (2008). Retrieved June 25, 2009, from The University of Michigan, 3D Lab Web site: http://um3d.dc.umich.edu/hardware/CAVE/.