

On the Forefront BioNetwork Advances Immersive, Interactive Training

By Fatima Khan

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Many educators as well as experts within the information and communication industry concur that in order to stay competitive, the nature and act of learning must change. Proponents of immersive learning believe using new approaches to training such as virtual, interactive simulation have the potential to transform how people learn.

BioNetwork, the North Carolina Community College System’s (NCCCS) statewide initiative providing specialized workforce training and curriculum development for North Carolina’s life sciences industry, is on the forefront of interactive and immersive simulation training. In collaboration with industry partners, BioNetwork is expanding technology’s role within education in all 58 community colleges by offering advanced learning technology courses and developing on-the-job virtual training content.

WHAT IS IMMERSIVE LEARNING?

One of the most prominent signs of our time is the overload of information via the Internet or any variety of multi-media venues. The combination of too much

information and too little time is a stressor. Unless a company has large resources to spend on teaching employees the valuable skill of discernment, trainees are left to their own devices to catch-up in a rapidly changing world.



Enter advanced learning technology, an umbrella term that includes various non-traditional methods of learning such as immersive learning, distance learning, webinars, e-learning, visual and interactive simulations and serious gaming. Immersive learning is a highly interactive learning experience in which the learner engages with the content to both facilitate active learning and develop problem solving skills. Through serious games, video games intended for learning and training, students and trainees apply math, science, analytical and spatial skills to learn a specific process.

“Typically, people don’t learn by memory,” said Stephen Wallace, training manager at Covidien's pharmaceutical plant in Raleigh. “They learn by doing. Immersive learning engages that memory function by providing an opportunity to repeat the doing and learning of a skill. Instead of a training-by-telling approach, which offers no opportunity for follow-up, immersive learning has become an effective new trend within the industry.”

WHERE GAMES BECOME TRAINING

The Research Triangle Park is one of three major hubs in the nation for gaming and simulation development. Both educational and corporate sectors within North Carolina as well as other countries like Germany have recognized the value of immersive learning strategies and have approached BioNetwork to collaborate.

“North Carolina is definitely a pioneer in this field,” said Doug Drabble, manager of BioNetwork’s Winston-Salem-based Pharma Center. Drabble, who is also head of the Analytical Training Center in Winston-Salem, is currently working with Wake Technical and Fayetteville Technical community colleges in establishing digital interactive simulation tools that instructors can use to supplement the training courses offered at the center. The digital tool is a fully functional and interactive simulation.

Already, several pharmaceutical companies in the RTP area have asked him to set up a serious game using these virtual tools to help train technicians on various aspects of their operation. Eighteen RTP-companies have expressed interest in sending their employees to the Analytical Training Center for 40-plus hour courses.

The digital interactive simulation training can come before the hands-on applications. This reduction in a company's lead time is important and cost-saving. "Companies can use immersive learning to train on a simulated new piece of equipment before the equipment arrives," Wallace said.

The Analytical Training Center provides curriculum support for all of the 58 North Carolina community colleges. Upon completion of these virtual tools, BioNetwork can pass them along as a free add-on to its member colleges and offer it to industry partners at a heavily discounted price.

"Within the rapidly changing pharmaceutical industry, training programs are usually pressed for time or funding so the quality and effectiveness of a timely and resourceful training program has to be aligned with innovation. Traditional classrooms don't always provide the multi-media experience that students need to retain the learning," Wallace said. "They also lack the repeatability of self-paced, problem-solving opportunities that immersive learning platforms can provide."

While the military has been using virtual simulation training for Air Force pilots and the Army for years, one of the main reasons it has not permeated business is due to high costs. "Slowly, we are bringing virtual training into education," said Bob Ervin, vice president of learning technologies at Fayetteville Technical Community College. Ervin also oversees the interactive 3-D content of the Advanced Visualization Center (AVC) established in June 2008. The Center is one of ten in the world, three of which are located in the U.S.

Ervin's Center offers a 16-week certificate as part of a Web Technology program. The Center in conjunction with BioNetwork works on content development for industry and offers technical job training skills by bringing 3-D simulations into the classroom. Corporations are approached and asked what their needs are so that BioNetwork can tailor content and research to meet those needs. Once the need is identified, a virtual copy of the process is developed. As with the Analytical Training Center, the virtual copy can be used by all of the 58 community colleges and the benefits passed on to industry for a small fee.

"When my Innovation Team asked faculty what aspects were the most difficult to teach, a dental hygienist stated that a plastic model of the human head just wasn't enough to use to explain anatomy to students. We developed a virtual copy of the human head, one that reveals muscles, bones, blood vessels and the skin in 3-D. It enables students to peel back any layer they want to view the anatomy in any order, as many times as they desire. This virtual copy can be used by students in the anatomy, cosmetology and biology departments as well," he explained.

Community colleges and K-12 educators are benefiting from immersive learning techniques. Any faculty wishing to use virtual training in schools or in continuing education classes are encouraged to attend summer courses in game development. A grant from the National Science Foundation (NSF) is helping BioNetwork to provide the backdrop for this coursework.

With help from a grant from the Golden Leaf Foundation, BioNetwork is also being provided funding to put a delivery system in place in several high schools around the Fort Bragg area. "This virtual delivery system will include a portable projector with 3-D glasses which allows students to touch an object floating in the air like a human skeletal head. Projects like these are accumulated and deposited into a digital library which is then shared among all the community colleges," Ervin said.

BioNetwork's Analytical Training Center in Winston-Salem can run a variety of virtual training processes in a number of areas:

- **Medical Practices: the testing of bodily materials**
- **BioManufacturing, Biotechnology and Pharmaceutical: drug testing**
- **Dietary/Supplements: the analyses of nutrients**
- **Medical Devices: analyses of softeners needed for plastics**
- **Food Industry: analyses of various contaminants in products**
- **Environmental, Soil and Hazardous Waste: components of the air, soil and other waste materials**
- **Chemical and Biofuels: analyses of materials for biofuels development and research**
- **Customer Service/Hospitality: virtual modules for customer support**

AFFORDABLE, EFFICIENT, CONVENIENT AND SAFE

Companies today face increasing economic pressure, which may impact the quality of corporate training programs. A virtual training set-up in a serious game mode has multiple benefits for business. Primarily, it lessens risk since the trainee can repeat mistakes without undergoing bodily harm or damage to equipment. This in turn reduces liability.

“For example, a Biosafety Level 4 Laboratory is potentially dangerous for trainees to practice in,” said Matthew Meyer, BioNetwork director. “However, virtual training simulation scenarios can easily simulate the intense safety measures and critical environment found in this particular type of lab without the risk.”

Virtual set-ups also have built-in tracking features that can inform the trainee where errors have been made and allow him to fail safely until the process is correctly learned. An instructor can monitor the trainee’s progress in real-time. This helps to reduce the time of an employee’s learning curve. “The advantage of serious gaming lies in its



interactiveness and repetitiveness,” said Kai Wang, head of simulation and gaming development at Wake Technical Community College. “Serious gaming is not like e-learning. E-learning does not leave room for interactive play nor does it measure performance.”

The use of simulation training methods is convenient. It can be loaded on the computer and a

mouse can be used to maneuver within the environment. Since it is usable from remote locations, virtual training can help fill gaps in education and workforce development in North Carolina’s rural areas. No extra expenses such as travel, food or lodging are incurred in a simulated training process.

Experts in the gaming and virtual simulation industry believe the cost to develop immersive learning practices justifies its use. Virtual tools are low maintenance. They can be updated quickly to conform to changing practices. They are also long-lasting with a life of up to 10 years.

FLEXIBILITY AND ATTITUDE

Instructors increasingly acknowledge the value of virtual learning as a tool that enhances, not restricts, their teaching goals. Virtual learning does not replace human instruction but simply adds to its value. Because instructors cannot be available nor can facilities be open at all hours, immersive learning is a convenient option. Instructors have the liberty to adopt those learning technologies which are easy to manipulate and adapt to their own styles. Also, the role of virtual tutors is growing. These virtual teachers are sometimes embedded in the serious game or are independent. They replace human instruction and help mediate the simulation and enhance the learning experience.

“Faculty can be mentored on how to incorporate advanced learning technologies in a hybrid format, which could mean standard hands-on training blended with immersive or other web-based learning,” Meyer said.

“The vision is to immerse students in realistic virtual environments that provide access to highly technical equipment and complex processes and also develop confidence without the added pressure of product failure and financial loss to the company. It is a win-win situation for industry and education,” said Vernon Shoaf, manager of BioNetwork’s BioEducation Center in Dallas.

Immersive learning can provide a doorway into significant skill-set changes for generations of workers and students to come. ❶

ABOUT BIONETWORK



NCCCS BioNetwork is a statewide initiative that connects community colleges across North Carolina, providing specialized training, curricula and equipment to develop a world-class workforce for the biotechnology, pharmaceutical and life sciences industries. All community colleges serving the pharmaceutical and biotechnology sector are part of BioNetwork. BioNetwork offers specific programs and services through the Capstone Center and Validation Academy, Raleigh; Bioprocessing Center, Greenville; Pharmaceutical Center and National Center for Workforce Development, Winston-Salem; BioAgriculture Center, Lumberton; BioEducation Center, Dallas; and BioBusiness Center, Asheville. For more information about BioNetwork, please visit www.ncbionetwork.org.