Simulation: bringing e-learning to a new level
By: Phil Davies
July 1, 2003
URL: http://www.computeruser.com/articles/2207.1.1.1.0701.03.html

As an engineer in the U.S. Navy, Ken Freyer learned how to run a hydrofoil's powerful gas-turbine engines on a computer, manipulating virtual controls in a program that simulated the consequences of making a mistake while skimming across the water at 35 knots.

Today, as a local manager for Verizon Communications in Aberdeen, N.J., Freyer sharpens his leadership skills by playing a computer game that conjures up a series of business meetings of escalating complexity and anxiety potential. Obeying rules laid down by a sophisticated fuzzy logic system, the characters in "Virtual Leader" seem to have minds of their own; they voice objections, snipe at each other, yawn, threaten to walk out. Flummoxed at first by the program's realism and unpredictability, Freyer quickly learned what works and doesn't work in virtual management--and began to apply those lessons to his real-life job supervising 17 telephone technicians.

"'Virtual Leader' really gets you to listen more," he says. "You have to build consensus rather than sit there and say, 'Hey, from now on this is what we're going to do, all right?' When you realize what makes you more effective as a manager, your own meetings become more effective."

The concept behind computer-based simulation in e-learning is simple, and compelling: Practice makes perfect. Pioneered in the 1970s by the military and airlines, simulation training has since become part of the training regimen for nuclear engineers, telecom technicians, and financial forecasters--disciplines where making a mistake in the real world can be costly. And increasingly, e-learning vendors and corporate training departments are applying that logic to mainstream business skills such as team building, project management, consultative sales, customer service, and strategic thinking.

If simulation can train a pilot to land a jumbo jet, and a technician to configure a router correctly, why can't it be applied to business tasks where the cost of failure--alienating a subordinate or customer, blowing a major sale, bungling a Web development project--can be just as high?

No reason at all, says Len Sherman, head of strategy and business development for Accenture Learning an e-learning provider that emphasizes simulation in its coursework. Computer simulation merely automates an age-old teaching method in which the apprentice received hands-on tutelage from a master artisan, he says; experiencing failure was part of the process.

"In essence, we're going back to the future, using technology to recreate the best elements of the historic way of learning," Sherman says. "The most powerful way to learn something is to try something and not succeed, figure out what went wrong, go back, dust yourself off, and do it again."

More powerful processors, high-end graphics cards, and animation tools such as Macromedia Flash have brought simulation to the desktop over the past two years, allowing employees like Freyer to practice their newfound skills during lunch breaks and at home as well as in a traditional e-learning lab. Flash technology is "probably the greatest single advance that's enabled simulation in e-learning," according to Nathaniel Palmer, chief analyst with the Delphi Group, a technology consulting firm in Boston.

Last fall, Gartner Research dubbed simulation the new "killer application" in e-learning, predicting that by 2006, 70 percent of all e-learning content would incorporate simulation.

A multitude of e-learning vendors incorporate some type of simulation into their courseware, often as a component of "blended learning" that mixes online courses with live classroom instruction. Besides Accenture Learning, leading suppliers of computer simulation for business "soft" skills and management training include Ninth House Network, NETg, and CognitiveArts. Other small, innovative companies such as SimuLearn (creator of "Virtual Leader") and Pulse Entertainment have developed simulation technology that is truly immersive and game-like, capable of responding instantly and subtly to user input.

Are we there yet?

Applying the principles of flight, battlefield, or network simulation to the office or boardroom--environments in which an almost infinite set of human variables comes into play--isn't as easy as it sounds in e-learning marketing pitches. For one thing, vendors don't agree on exactly what e-learning simulation is--how realistic and interactive the virtual experience has to be to effectively engage the mind and hone analytical and social skills. "Right now there's a tremendous amount of hype and over-marketing going on where everyone is saying, 'What we have is simulation,'" says Clark Aldrich, co-founder of Norwalk, Conn.-based SimuLearn and a former Gartner e-learning analyst.
In addition, training managers must choose from an array of simulation programs geared to different classes of employees—sales people, customer service reps, first-line supervisors, middle managers, and top executives. And in an immature market, developing simulations—especially highly interactive, game-style sims—remains expensive and time consuming.

As engaging as TV

Many simulations for mainstream business make extensive use of audio, streamed video, Flash effects, and branching architecture to create environments where users can put into practice the lessons they learned in the content portion of the courseware. Clicking on the correct response or snippet of dialogue moves the simulation along to the next scenario or role-play; those who wander down the wrong logical path receive timely feedback from onscreen coaches or mentors, and the chance to take another crack at the simulation.

Ninth House's lush, cinematic simulations of white-collar workers grappling with the challenges of sales, hiring, project coordination, and day-to-day management fit this model. The San Francisco-based company, one of the three biggest e-learning providers in the country, licenses content from well-known authors such as Tom Peters and Ken ("The One Minute Manager") Blanchard to create embedded, movie-like simulations. In each eSeries, learners help an employee of a fictitious company analyze problems and solve them by collaborating with co-workers at various levels of the organization. The vignettes, produced with Hollywood talent and streamed off the Web or from CDs, are designed to appeal to a mass audience—Baby Boomers and Generation Xers raised on TV and movies. "Our challenge was to build nothing that was going to be in any way less engaging than television," says CEO Jeff Snipes.

Unlike Ninth House's programs, which require a broadband connection for online delivery, Accenture's will play at dial-up speeds; in-house developers eschewed streamed video in favor of still photos, "war stories" from consultants, and Flash audio clips and animation.

The complete courses, targeted at sales forces, call-center agents, financial services employees, and retail workers, cost as little as $100 for an off-the-shelf Indeliq course and as much as $100,000 for a customized course tailored to a corporation's culture and specific business problem.

Other companies offering this type of linear, branched-video simulation for business soft-skills training include:

-- NETg of Naperville Ill., which also offers online or CD-based instruction in IT and desktop software;  
-- Knowlagent, an Atlanta-based specialist in replicating the customer experience for agents in call centers; and
-- CognitiveArts of Evanston, Ill., a division of NIIT Technologies that develops custom e-learning content for Global 2000 companies.

Training meets "The Sims"

Products like Virtual Leader and Pulse's Veepers authoring software take a radically different approach to business simulation. Driven by complex algorithms, virtual characters—also called avatars or bots—react in real time to user input, just as they do in "The Sims," the popular PC game. Verisimilitude and an element of unpredictability make this type of simulation ideal for teaching nuanced, people-oriented skills, says Aldrich of SimuLearn. Essentially, the computer automates live role-play, a prohibitively expensive training exercise for most organizations. But highly interactive, immersive simulation is still largely in the experimental or pilot stage at U.S. companies. Barriers to widespread acceptance include concerns about ease of use, expense, and a lack of standard courseware development tools.

Virtual Leader's realism challenges or intimidates, depending on your state of mind. Help features—thought balloons that parse the motivations of individual characters, and a "leadership EKG" that monitors the meeting's vital signs—proffer hints without giving the game away. By the fifth meeting, the fate of the company rests on how adroitly the player navigates political and emotional shoals, clicking on icons to encourage, scold, or cajole. "It takes a tremendous amount of concentration to play it," Aldrich says. "There are people who literally sweat playing it. Things go awry very quickly if you're not on top of things."
Intense, client-side processing requires the program, priced at $500 for a single license, to run off CD-ROM--an added complication for e-learning distribution and administration.

Verizon is one of more than 20 companies testing the program with select groups of employees. Freyer and nine other first-line supervisors matched wits with Virtual Leader last spring, following up five weeks of lab training with brush-up sessions at their desks and at home. A peer review slated for this summer will help determine whether Freyer and his fellow supervisors have indeed become better leaders by playing a computer game.

Pulse Veepers, originally developed to add pizzazz to online advertising, transforms a still photograph into a 3D simulacrum that talks, nods, frowns, pouts, looks disgusted, raises its eyebrows and emotes in other ways in response to learner input (see sidebar). The San Francisco firm has positioned Veepers as a cheaper, more efficient alternative to streamed video.

"Veeperizing" still photos costs a fraction of video production, and because the images take up as little as 100 KB, they can be piped over dial-up Internet connections to home and mobile workers. Avatars also lend themselves to endless manipulation; changing the outcome of a virtual encounter is simply a matter of editing the JavaScript that controls the character's responses and behavioral tics.

For all its apparent merits, Veepers has faced tough sledding in the e-learning market. Andrew Keen, Pulse's senior director of training and education, blames slashed e-learning budgets and a lack of imagination on the part of chief learning officers and courseware vendors: "People say, 'Wow, we're blown away by your technology,' but when it comes to actually buying it, it's a very different conversation."

However, the company does have licensing agreements with companies such as IBM, SBC Ameritech, and Raytheon--large enterprises with the resources to produce their own e-learning courseware. Raytheon Learning Institutes (RLS), responsible for training 80,000 Raytheon employees worldwide, plans to incorporate Veepers into its e-learning courseware by using Propel, a browser-based courseware creation tool developed in concert with Pulse and Intelladon Corp.

Another type of advanced simulation aims to draw the learner deeper into a business process, the better to foster what-if, big-picture thinking. Expert systems technology creates dynamic microcosms of assembly lines, supply chains, and business deals--processes too complex and fluid to capture in a static diagram or flow chart.

A $1,300 software package developed by Simul8 of Herndon, Va. recreates any business process that involves the flow of orders, people, transactions, or products. Change one parameter in a simulation, and graphic elements march across the screen, setting off a chain reaction of events that produces a different outcome. One Simul8 customer, a U.S. furniture manufacturer, used simulation to show retailers how its ordering decisions affect production schedules.

We're not there yet

Immersive, game-like simulations may be cool, but few will get to play them unless the software can be smoothly integrated into e-learning courseware. Palmer of The Delphi Group notes that most simulation authoring software today is proprietary, or restricted to certain technologies. Propel, for example, which Raytheon intends to license to other courseware developers, is designed specifically for Pulse Veepers. Fragmented courseware development drives up costs, putting cutting-edge simulation beyond the reach of most mid-sized and small companies. "Unless there is standardization, making [high-end] simulation easier to come by, you're not going to see a lot of mainstream development of it," Palmer says.

A new version of SCORM--the de facto standard for integrating e-learning content and code--is expected to make it easier to string simulations together in the proper sequence within courseware. The next generation of SCORM, with specs developed by the Advanced Distributed Learning (ADL) Initiative, is due out early next year.

Gartner might be guilty of hyperbole in predicting that simulation will dominate e-learning within a few years. Even after the economy bounces back and courseware integration becomes standardized, providers of both branching-video and game-style simulations are likely to encounter resistance from companies that question whether business soft skills can be taught on a computer.

Part of the problem is that nobody has shown definitively that simulation training works in the business world. In gauging the impact of e-learning initiatives on sales, customer satisfaction, or overall company performance, training departments don't isolate simulation from other forms of online content, such as workbooks and lectures. An exception is call centers that have switched from traditional computer training to simulation. The reservations arm of Hilton Hotels lowered agent turnover by a third and hit minimum performance benchmarks 41 percent faster after rolling out Knowlagent's StarTrainer in its reservations centers two years ago.

Compounding a dearth of stats is a mindset at many companies that dismisses video minidramas, Flash animation, and virtual characters as manifestations of pop culture, unsuitable for serious business instruction. "It's kind of a shame," says Snipes of Ninth House. "We know so much about how the brain works and how people adopt new skills and behaviors today, yet we continue to put people in classrooms and simply talk at them and read off of flipcharts."

But the basic idea of simulation--the more realistic the computer experience, the more engaged the mind becomes, accelerating learning and retention--remains compelling.
Raytheon's courseware developers can't wait to start experimenting with Pulse Veepers, says Phillip Scheidhauer, senior manager of RLS. "This is really the first experience our developers have had [with avatars], and they're thrilled," he says. "I just took them through the first training session two weeks go, and they were drooling."

Article links:
Accenture Learning - http://www.accenture.com
SimuLearn - http://www.simulearn.net
Ninth House's - http://www.ninthhouse.com
Indeliq - http://www.indeliq.com
NETg - http://www.netg.com
Knowlagent - http://www.knowlagent.com
CognitiveArts - http://www.cognitivearts.com
Pulse's - http://www.pulse3d.com
Simul8 - http://www.stimul8.com
ADL - http://www.adlnet.org