Simulation Training:
Pros & Cons

For Professor Patty Viajar

By Gregg Peterson
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“If they don’t have hands-on time, they might as well not even come to class!” That was a quote from my mentor as I was learning to be a technical trainer, illustrating the importance of having students actually practice the procedures we were teaching. I quickly came to agree as I noticed that retention of knowledge about a procedure was almost zero unless the student actually practiced that procedure. As I went on to design and develop CBT, my mentor’s quote has never been far from me. But how do students practice when learning with CBT? One answer is called “simulation training”. Simulation training is the process of a student learning a procedure through practice in a “simulated” or imitated environment before doing the procedure in the real-world. I have created simulation training in the past, so I know what I think of the subject, but I have always been curious to see what others think of it. So let us take a look at what the expert’s say the pros and cons of simulation training are.

Simulation training can take on many forms. Some examples include the manufacturing process simulator found at Cooperative Refining LLC in McPherson, Kansas. This simulator lets employees practice controlling the complex and sometimes dangerous process of refining crude oil into many different petroleum based products. Students sit at a terminal that looks and reacts just like the one they will be using on the job. But instead of actually opening actual valves and starting actual burners with their actions, they are just triggering feedback on how they performed in this mock refinery.

Another example of simulation training comes from the New Jersey Transit (NJT) training center. Here bus drivers use simulators to learn how to drive a bus and how react to number of emergency and distracting situations. The NJT uses a couple of different types of simulators to get the job done. One type of simulator involves the student sitting in front
of a typical computer, using a game-like steering wheel to control a game-like computer program to control a bus and “get a feel” for these large vehicles. The other is more complex and involves an 1/10th scale model of a bus in a model city with real cameras displaying the world to a driver sitting in a life-size mock-up of a bus. The student drives the model bus through the model city and gets to feel and experience any mistakes they make, such as cutting a corner to close and going up onto the curb.

Another type, and probably the most common type, is the software simulation done by Applied Materials. This CD-ROM base package lets the student practice operating a piece of multi-million dollar semiconductor processing equipment on their own computer. Students are asked to load up a sample wafer and are asked to create a fictitious, but accurate control program, similar to a recipe, used by the machine to control the way the machine would process a wafer in a real world fab. This type of simulator training is probably the most common because of the relatively low cost to develop and the ability of the training to be run on any typical computer system, which brings me to the subject of pros and cons of simulator training.

Let’s start with the pros and work our way to the cons. We know that my mentor approve of good simulation training, where you get good simulated hands-on time, but what do other people say? To tell you the truth, in looking for the pros, I was a little surprised by the rhetoric people were using when talking about simulation training. In an article in Training magazine on the 10 guiding principles that we have learned about e-learning, e-learning experts make some interesting statements regarding simulation training. These experts, include e-learning luminaries such as Gloria Gery, Brandon Hall, Clark Aldrich, and Tom Kelly (VP of Internet Learning Solutions group at Cisco). Overall,
they say that “smoke and mirrors, evanescent promises, and hype. All these once characterized the business of e-learning.” But regarding the future of e-learning they say, “We see great promise – a promise beginning to be fulfilled in small, on-demand learning modules, simulations and games, and in performance support…”. They go on to say, “there is a good deal of consensus…regarding 10 things we know for sure work in e-learning… the most promising of the learning methods, are games and simulations, performance support tools, and short learning modules…”

Brandon Hall agrees that games and simulations have a basic allure to learners that has been avoided by instructional designers in the past. He says, “If you asked a traditional instructional designer to create a course on city planning – it would likely be a snore, but look at SimCity. It’s really a city planning simulation that people pay money to play.” Cisco’s Kelly is big on simulations, saying, “Our experience is that if it’s exciting, relevant, and challenging, people will really get into it. With these kinds of application, we’ve found learning to be contagious and universally accepted.” Clark Aldrich, former market analysis emeritus and e-learning practice leader at the GartnerGroup in Stanford, Conn., believes that simulations are so fundamental to the future of online learning that he left the Gartner Group to extensively study them. He says, “Simulations are the way more of us will learn. They teach us at the emotional, not intellectual level, and this represents a huge shift for the learning group.” He notes that we’ve been used to teaching people processes, but within simulations knowledge transfer is much deeper.

So it appears that we have quite a few of “pros” for simulation training. Certainly, according to these experts, simulation training appears to be an up and coming training and learning sensation. Simulation training is an engaging, entertaining, exciting, relevant,
challenging, and effective way to train students. If done well simulation training can engage the learner on a different, deeper, more emotional level than typical training models. Simulations can even effectively appeal to the competitive streak in a learner. In our refinery simulation example, the “pros” are that students can practice dealing with dangerous situations in a non-dangerous environment. The idea being that when they confront actual problems in the real world, they will be able to handle them in stride and may even be able to save lives. Richard Ortloff, the training director at the oil refinery, says that if we do things smoother, we will naturally be more profitable. Tom O’Kane, the New Jersey Transit’s director of training, says that the bus simulator has increased the consistency of quality training. He says the students can go out and handle the bus like it is nothing and that accidents have gone down by 75% with the simulator training. And Jon Joseph, a training manager at Applied Materials, said that students can make mistakes operating the simulated multi-million dollar equipment and not make them when it really counts (and costs).

So we know there are many “pros” to simulation training, but how about the cons? Clearly the biggest problem with simulator training is the cost. Simulator training development is expensive to develop. In our first example, the oil refinery simulation, Ortloff from the refinery says the total cost to develop the training was whopping $750,000 and that the only way they could afford to pay for this kind of training was to get subsidies and tax breaks through the state of Kansas. O’Kane from New Jersey Transit, says that the bus simulators cost a hefty $480,000 to develop. Joseph from Applied Materials said the software simulation came in at slightly more reasonable $200,000. This cost is approaching
what any high end, high interactivity, high media use non-simulation CBT would cost to produce.

So even though simulation training costs more to develop, if you have a training need that can be best handled through a simulation, it may be worth the cost. Regardless, it looks like simulation training is just getting started and has a lot to offer. One thing is for sure regarding simulation training.. I know my mentor would approve.