Video Games as Medical Education Tools

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—By Scott Harris

Video games are moving up in the world.

Once the domain of basement playrooms, over time they have moved to dorm rooms and living rooms. Now, some educators say they are ready for the classroom.

Medical schools around the country are creating video games with the expressed goal of improving medical education.

The idea of using video games for educational purposes began in the aviation and military sectors, where realistic dry runs have a clear value given the high-risk actions that are inherent to those fields and are difficult (if not impossible) to simulate in reality.

But the idea is spreading elsewhere, in part, because of one other simple fact: Games are fun.

"Video games have been used for decades now as teaching tools," said Bryan Bergeron, M.D., who has created several health care-related games and is a research affiliate with the Health Sciences and Technology Division at Harvard Medical School and MIT and author of the book "Developing Serious Games."

"It has a low cost to participants," Bergeron says, "because you don't actually have to go through the experience. But it is also seen as a way to get people included and excited. When you're excited, your mind works better. Your synapses are firing more rapidly, and your brain is fully awake. In games, there is a sense of uncertainty. If you know what's going to happen, there's no harm in going to sleep. But with games, it's different. You're fully awake, and the information gets into your cortex."

According to a 2008 survey from the Pew Internet and American Life Project, 97 percent of children ages 12 through 17 play video games, with little difference in percentages along racial, ethnic, or socioeconomic lines. In a 2011 study published in the journal Medical Teacher, a team led by researchers from the University of Minnesota Medical School studied the educational effects of a video trivia game on the psychopharmacology knowledge of 29 third-year medical students.

The study authors concluded that "although academic games do not provide thorough answers to all the demands of comprehensive learning tasks in a psychiatric curriculum, they could encourage the students' involvement and increase their motivation and interest in learning."

At Florida State University College of Medicine, students in geriatrics clerkships play ElderQuest, a role-playing game in which players work to locate the Gray Sage, a powerful wizard in poor health that each player must nurse back to health.

"My kids play these types of games at home, and I noticed they played a certain level over and over until they succeeded, and when they were done they would know everything about that level," said Alice Pomidor, M.D., M.P.H., an associate geriatrics professor at Florida State and one of the coordinators of the ElderQuest pilot. "My son would arrange to meet online with a team, and my thought was that it looked like a geriatrics team. I thought people could learn to use the teamwork principles while still having fun playing the game."

ElderQuest players—known in the game as "novice healers"—traverse a forest of germs, which they must vanquish with the correct antibiotics. When crossing a certain bridge, different vision defects distort the picture on the screen. In a magical orchard, medications grow on trees, and players must harvest the right ones while avoiding those that are defined as inappropriate or risky by the Beers List, which documents different drugs and drug combinations that should or should not be prescribed to elderly patients with different conditions.

Pomidor said the game seems to resonate with learners.

"Geriatrics is often overlooked and seen as difficult, or not overly glamorous," Pomidor said. "The students need to have something fun to do. If it's fun, they'll play it whether they want to learn or not. So far, they think the idea is really cool. We feel we need to do something for the millennial generation. They don't read, they multitask, and they do everything online."

Pomidor received a discount on the game design thanks to her husband, a professional game designer. She estimated the cost of the game and pilot study at about $60,000. However, Bergeron said the cost of designing a video game is far lower than it once was; do-it-yourselfers can purchase a game development shell for as little as $200.

"The tools aren't that expensive anymore," Bergeron said. "Today, the bigger cost is in time and expertise. It takes understanding of how to make a game. The best game

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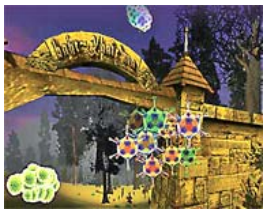

In the fantasy game Elderquest, medical students learn about geriatrics issues, such as medication and vision problems, as they play.

designers are the best game players. You just have to find a group of students willing to put in the time."

Games can also play a role in quality improvement training. At Duke University Medical Center's Human Simulation and Patient Safety Center, center director Jeffrey M. Taekman, M.D., works with students in game-style environments to improve quality processes across the continuum of medical education.

"There's plenty of evidence that shows that lecture-based learning does not change behavior," Taekman said. "Simulation, whether it's mannequin-based or games-based, will have a growing role. If you believe immersive learning is a way to change behavior, simulation is the gold standard. We saw a role for this in undergraduate, graduate, and continuing medical education."

Duke's game, 3DiTeams, was inspired by military simulations and places students in a virtual environment where they must divide responsibilities and ultimately save gravely wounded patients. Since the game works with almost any computer, learners need not all go to the simulation center, which would cause backlogs and delays.

"We have a throughput issue here," Taekman said. "We don't have the infrastructure to get everybody through in a timely fashion. These game platforms run on regular computers. So it can be pushed out and used anywhere."

As with the rest of society, technology seems to change the video game industry on an almost daily basis. The latest example is adaptive learning, a new style of gaming in which the game's computer identifies the areas of greatest strength and weakness in a given player's performance, and adjusts the game and its objectives accordingly. One off-the-shelf example is Black Ops, a military action game.

"The game learns how you play, and learns where you are confident and not so confident, and it tailors the game to you in different ways," Bergeron said. "It knows your competencies and presents stories to you that force you to adapt. There are great educational implications here. For example, if you are good at physics but not as much at chemistry, it learns that. It goes right to what you need to learn or to know."

It's just one of the ways video games can become, and are becoming, effective teaching tools for a new generation.

"Today, everything is integrated, and that's how education is coming together as well," Bergeron said. "It used to be that first-year medical students would be the only audience, because they were the only ones who didn't think games were stupid. But now, it goes across the entire continuum."