

Learning Through Games

Electronic games can inspire players to explore new ideas and concepts. By gaining a better understanding of the dynamic between player and game, researchers hope to develop more interesting and effective approaches.

IT WASN'T UNTIL after he'd stopped working as a middle school choir teacher and joined one of Microsoft's software testing units that Jeremy Tate first encountered *Guitar Hero*. A gaming enthusiast, Tate was quickly hooked. And as he grew more familiar with the game and observed others at play, he noticed how *Guitar Hero* helps gamers master challenging musical concepts, such as phrasing and rhythm, notions he had struggled to teach his own students.

"Players are taught instantly, as a function of the game," Tate explains. "Want a better score? Do it right next time." He's now talking to several teachers in his old school district about putting his observations to use and bringing music video games like *Guitar Hero*, *Lips*, and others into the classroom.

In many ways, of course, it's not surprising that educators could make use of an electronic medium teens have already widely embraced. According to a 2008 survey conducted by the Washington, D.C.-based Pew Research Center, 97% of children between the ages of 12 and 17 play computer, Web, portable, or console games. Among many adults, the popular perception of these games is that they have little redeeming value and may harm children by desensitizing them to violence. Over the past few years, however, a new body of research has begun to demonstrate how games can have a positive effect on youngsters by stimulating their imaginations, sparking their curiosity, and promoting the exploration of difficult issues and concepts. Off-the-shelf games like *Sim City*, *Civilization*, and *Railroad Tycoon* have been successfully used in the classroom to help students understand complex social, historical, and economic processes. Tim Rylands, a teacher at a primary school near Bris-



Games like *Guitar Hero III: Legends of Rock* simulate the playing of a real guitar and teach players how to master challenging musical concepts, such as phrasing and rhythm.

tol, England, made headlines in 2005 for his award-winning use of *Myst* to improve students' writing skills. And *World of Warcraft* has been praised by educational researchers at the University of Wisconsin-Madison for its ability to foster abstract thinking among middle and high school students, who meet online to share strategies and ideas about the game.

"Games are goal-directed learning spaces," says James Gee, a professor of literacy studies at Arizona State University who has done extensive work on the subject. According to Gee, games give children the tools they need to explore complex systems and experiment with different possibilities and outcomes. Rather than simply memorizing figures and statistics, children learn to constructively use facts to solve problems. In a game whose objective is to design and build a city, for example, kids end up not only learning about building codes, but how to put them to use. In *Civilization III*, a game in which players

lead a civilization from 4,000 B.C. to the present, students are frequently motivated to consult maps, Wikipedia, and other external resources to get ahead.

"Could there be a better learning philosophy for the 21st century?" asks Gee.

Games as Interactive Platforms

The tricky part, of course, is figuring out why certain games advance learning. What factors keep students engaged? What features encourage them to apply what they've learned to real problems? Too many titles that are currently marketed as educational games, experts say, are little more than digital flashcards, presenting students with straightforward drills in subjects like math and grammar rather than giving them an interactive platform through which to explore new ideas and concepts. By gaining a more sophisticated understanding of the dynamic between player and game, researchers hope they can de-

velop more interesting and effective approaches.

To meet those challenges, specialized research groups have sprung up at universities across the country. New York University's Games for Learning Institute (G4LI), for example, offers a forum for experts in disciplines like computer science, cognition, and educational research to collaborate on experiments and research. Founded in 2008 with funding from Microsoft, G4LI's mission is to conduct rigorous empirical research into how games can support learning. Thus far, work has focused on science, technology, engineering, and math topics and on middle school, when children typically lose interest in those subjects.

"We're moving from individual case studies that address the effectiveness of a single game to a more descriptive, qualitative type of research," says Jan Plass, a professor of educational communication and technology at NYU and G4LI codirector. "We observe game play, we test things empirically ... we're interested in finding patterns." Plass's colleagues in the computer science department then build mini-games to test effective features—a particular incentive system or type of player support, for example—and further refine their understanding. G4LI researchers have also reached out to game developers and educators to analyze their experiences. The ultimate goal, says Plass, is to develop a comprehensive set of principles and standards that could help people effectively design, build, and use educational games.

Other game-related research is ongoing at University of Wisconsin-Madison, Massachusetts Institute of Technology, and Indiana University. Likewise, Games for Change, a New York nonprofit organization that focuses on social justice issues, provides an additional platform for people to share ideas, resources, and tools. Though many findings are preliminary, one important theme that's emerged is the need for teaching material to be integrated into the framework of a game's design rather than added to it later. "You need something that allows knowledge to unfold," says Katherine Isbister, a professor of digital media and computer science and engineering at New York University's Polytechnic

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Institute and an investigator at G4LI. It's therefore important to start with a definite set of ideas and objectives rather than a structure of play.

Ian Bogost, a founding partner of Atlanta-based gaming studio Persuasive Games, concurs. Effective educational games, says Bogost, construct a model of how a particular issue or subject works. Players then interact with that model to understand its contours and reasoning, and can ultimately decide whether to embrace or reject it.


"It's through the experience of making choices that you learn," he asserts.

Bogost and his colleagues build educational games for a diverse set of corporate and nonprofit clients. Large companies want games that give them a more engaging way of training new workers, or make themselves more appealing to younger customers. Political and nonprofit organizations, on the other hand, are trying to reach teens and educate them about problems like climate change and poverty. Persuasive Games has also developed several issues-based games of its own. Unfortunately, Bogost says, it can be difficult to identify a market for these projects. ("If it's online, people expect it to be free," he sighs.)

Integrating games into secondary school classrooms can be challenging. Each district has its own curriculum and objectives. Some teachers are skeptical about gaming's pedagogical value, while others are unfamiliar with the variety of available games. For now, researchers say, the easiest way to get games into the classroom is at a grassroots level, and G4LI and other academic institutes are working hard to foster relationships with local schools.

At the university level, where games enjoy more widespread curricular support and adoption, computer science departments in particular have begun

to feel an effect. The most recent Taulbee Report indicates an upsurge in interest and enrollment in the field, and anecdotal evidence suggests that gaming may have played a role as games and gaming techniques help make core computer science principles more accessible to students. The prospect of being able to join the still-growing game development industry has also attracted new prospects to the field.

As researchers continue to work out principles of learning, cognition, and design, they would be well advised to keep an essential principle of the gaming industry in mind: Make it fun. It may not be what most teens think of when they think of school. But as Isbister points out, it's at the heart of why they play games—and is one of the main things that keeps them engaged and willing to persist in ways that many teachers only dream of. 

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