



Video Games in the Classroom

By Katherine C. Clark

Teachers have used games as instructional tools in the classroom for years. It's high time they recognized the instructional power of today's video games as well. According to a 2007 survey conducted by the national education nonprofit Project Tomorrow, 51% of the students surveyed said that electronic gaming made difficult concepts easier to understand.

Researchers echo that sentiment, arguing that while regular instruction tends to present information as abstract ideas, gaming places the subject matter within a meaningful context. Richard Van Eck wrote of instructional gaming, "What you must learn is directly related to the environment in which you learn and demonstrate it; thus, the learning is not only relevant but applied and practiced within that context."

One school that uses educational video games as instructional tools is Ocoee Middle School, a State Demonstration

School in Orange County, Florida. Ocoee Middle School showcases groundbreaking high-tech advances in learning as well as curriculum and teaching strategies that emphasize 21st century skills. Among the goals of the curriculum program is to connect students with the world and each other through technology; encourage students to work in groups as well as take individual initiative; and have children experience the excitement and "aha" factor of hands-on discovery using the latest technologies.

At Ocoee Middle School, instruction transforms the learning environment and keeps that spark of excitement palpable—especially in classrooms where more difficult subjects are being taught.

Lessons Learned

Since pre-algebra and algebra are common stumbling blocks for students, in late 2006, Ocoee Middle School chose to be

one of a handful of schools to implement math-based video games to support its math curriculum, specifically in pre-algebra and algebra. Students learn math concepts by completing first-person action adventure missions that incorporate three-dimensional graphics, sound, animation, and story lines comparable to those in popular video games.

The games used at Ocoee Middle School, *DimensionM* and *Evolver*, cover an extensive list of objectives aligned to the National Council of Teachers of Mathematics standards, but it's a good idea to check with each developer to know exactly what their games cover.

The plan was for educators to become familiar with the new technology and have fun with the games. Math teachers received one day of inservice training so they would have an overall understanding of the game. Any school that is planning to implement electronic games for instructional delivery

should allow time for teachers to become familiar with the program in advance of classroom introduction. That way, educators have the opportunity to overcome any trepidation that may come from being a non-gamer.

It is also a good idea for teachers to run a sample mission (or have a student run one) the first few times they use the game in the classroom so students are properly oriented to the games' environments.

Teachers do not have to be gamers themselves to use video games effectively. Traci Dunbar, an eighth grade math teacher, came up with a resourceful way to master the games. She told her first period class on the first day that they played the game, "I have never played this game. Log on and tell me how to play it so I can teach my second period." She continued to do that all day with each of her classes. By the end of the day, she knew the game and all the tricks so well that the students thought she was a genius.

Because the math concepts were embedded into adventure missions, students were motivated to keep trying to overcome obstacles or failures in order to complete their missions.

"To the kids, it's not math. It's a video game that has some math problems," says seventh grade math teacher Tony San Filippo. Students would stand in line, waiting for a turn to play a game when their classroom work was completed. Jeff Gallup, the school's instructional technology specialist, observes that the game is very engaging and kids want to play it. "You don't get that from a workbook," he says.

Another advantage of video games is that they can foster teamwork—an essential skill for the 21st century workplace. One of the papers presented at the 2005 Summit of Educational Games in Washington, D.C., entitled "Harnessing the Power of Video Games for Learning," stated, "Games and simulations hold promise for training team members to work effectively as a team, especially in decisionmaking, exercising judgment, and solving problems under pressure. ... These basic features of team training may have widespread applicability."

Ocoee Middle School has been able to

explore this aspect of electronic gaming for the past year. For example, as the students were working on linear equations, the teachers introduced multiplayer games that allowed students to compete against peers in their classroom, building, district, and even across the country.

Encouraging Learning Initiative

In 2007, the educators further integrated the video games into the math curriculum. They increased the number of single-player mission games and added several multiplayer games.

The multiplayer games give students the choice of beginner, intermediate, and advanced math play. Players can also choose which skills they want to work on or they can mix things up. For example, a game called Swarm allows for a random mix setting. The concepts of prime numbers, square roots, order of operation, and the greatest common factor are just some of the key concepts that could be covered in that one game.

The school has about 800 computers for student use, 32 of which are readily accessible in the classroom areas with another 20 available in the media center for game play before school starts. Therefore, students in a single class can use the

to friends and peers to ask about those concepts so that they can continue to play. As a result, teachers have had students master untaught math concepts because the students wanted to continue to advance in the games.

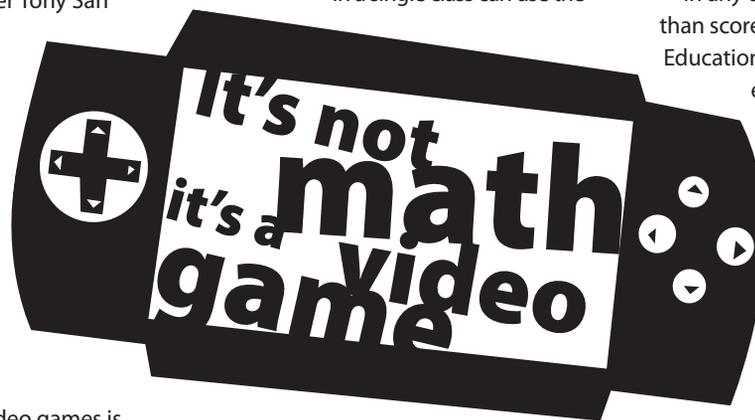
In addition, although pre-algebra and algebra are subjects taught in seventh and eighth grades respectively, the school has made the games available for all students, and students in the lower grades have shown unexpected initiative. "When I saw sixth graders asking eighth graders how to do the math so they can play the game, I saw the power that this type of gaming could have," says Keith Carney, the sixth grade math teacher. That unanticipated peer collaboration has been a welcome side benefit.

Tallying the Results

The school has not yet received its latest test scores, so administrators cannot calculate the impact the games have had on high-stakes test performance. However, teachers have reported definite gains in students' knowledge of divisibility, perfect squares, prime and composite numbers, and so on. Students also have displayed faster mental processing because winning many of the games depends on speed.

In any case, the games are about more than scores, they are about motivation. Educational gaming has had the desired effect: getting students to spend more time exploring complex math concepts before, during, and after class time. Students forget that they are learning about complicated topics such as coordinating systems and scatter plots, order of operations or proportions, but they are able to carry what they mastered in the game over to their work in the classroom.

In addition, because of the task-oriented nature of the games, players have become incredible problem solvers. In all, the games' capacity to cultivate social interaction, team problem-solving, and the motivation to improve math skills are of tremendous benefit to the students. **MG**



multiplayer games all at once without having to wait for a turn. They can also work on the games individually outside of class time.

Ocoee Middle School math teachers primarily use the games as reinforcement for subjects that have been already taught or for topics that the students are working on. However, since access to the games is not restricted, as students finish a level and move on through the game on their own, they often encounter math concepts teachers have not previously covered.

At those times, the students tend to go

Katherine C. Clark is the principal of Ocoee Middle School, which is designated as Florida's State Demonstration School for Technology. E-mail katherine.clark@ocps.net