EXERCISING WITH

EXERGAMING

Giving Physical Education a Technology Makeover

Kids love to play! At any age and in all stages, children want to have fun. Unfortunately, when many young people are searching for ways to have fun, they don't think of activities that involve physical exertion. Now, a relatively new tool on the market gives fun a creative flair, while at the same time promoting physical fitness. This new tool is called "exergaming." It can be used by innovative teachers to create fun-filled physical activities for their students.

Definition

The term *exergaming* encompasses video games, educational software games, online virtual worlds, social media games, and exercise-driven games.[1] The newer systems are flexible enough to be used by either individuals or groups. This article will focus on exergaming console systems and games that promote exercise and physical activity and are well suited for use in the school environment.

For the past few decades, childhood obesity and inactivity have been blamed on a whole host of causes, ranging from family influences[2] to concerns about safety and lack of opportunity for kids to exercise.[3] More recently, the blame has been directed toward technology—too much "screen time" (TV, Internet, and electronic games), and consequently, less time spent in active pursuits.[4] But technology may actually offer a creative solution, not only for small schools without a physical education teacher, but also for any teacher who wishes to promote health and exercise in a way that will appeal to students. This article will describe exergaming, tell who will benefit from it, offer tips on how to choose the right system for your classroom, and suggest ways to get started using it.

The benefits of exergaming include the following:

- It can be used in a variety of settings with a variety of users.
- Its versatility makes it readily adaptable for students with disabilities.
- Students with poor coordination will find it both comfortable to use and less humiliating than regular team sports (especially for one-person practice).
- It provides an excellent solution for schools that lack a gymnasium and thus cannot schedule physical education outdoors in bad weather.
- It is a great resource for the classroom teacher who must provide physical education instruction without having had much formal training.
- It enables small, multigrade schools to schedule physical education classes for students of varying ages and skill levels.
- It motivates students to be more active, while enhancing their skills.
- Teachers can use the games to stay fit, too!

Although exercise technology has developed over the past few decades, complex interactive video games have only recently become more available and affordable. A few years ago when I was teaching elementary/middle school, only a few video games focused on exercise.

In connection with my work as a physical education teacher, I (Perkins) conducted an unpublished study for my graduate program[5] using Sony PlayStation's Eye Toy, pedometers, heart

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rate monitors, and interest surveys. Thirty subjects participated in four separate trials. Two trials were conducted on students in regular physical education classes; the other two trials used exergaming software and equipment. The study compared physical activity in a "virtual world" versus activity in the "real world" of a physical education class.

I found that exergaming exercise was statistically equal both in steps taken (measured by pedometers) and in elevating heart rate (using heart rate monitors). The most intriguing finding of the study was that interest levels for engaging in physical activity using exergaming were noticeably higher than for "real world" exercise (based on interest surveys). I concluded that this technology could be an invaluable tool in physical education classes and that exergaming would also interest teachers in elementary classrooms.

Bonnie Mohnsen, for a number of years the foremost advocate for using technology in physical education, has extensively researched exergaming technology and reached similar conclusions about its usefulness. She says: "I believe that the next big technology to hit physical education will be virtual reality or lifelike simulations where students have the opportunity to practice motor skills and cognitive understanding and even experience motivational fitness activities."[6]

Judy Shasek, creator of Footgaming[7] and author of "Exerlearning: Movement, Fitness, Technology and Learning,"[8] also has written about using technology in exercise programs. She says that the excitement about computers and electronic games spans school settings and generations: "The game part of exergaming is undeniably compelling to students. They will come to school early, and come to school more often. When absenteeism drops, especially among the most challenged learners, a teacher is better able to do what he/she does best—teach!"[9]

In addition to aiding students in developing coordination, muscle tone, and endurance, exergaming can generate interest and excitement about physical activity. It also provides mental training skills and helps students learn the rules of various games.[10]

Physical educators have known for more than a century that good choices—such as an active lifestyle—are essential to improving and maintaining the health of individuals and nations.[11] The physical educator's job is critical in helping children learn to become active and to incorporate exercise into their lifestyle. Exergaming technology can play a role in motivating and establishing healthy behaviors in both children and adults by providing opportunities for individual and cross-generational play.

Using Exergaming in the Classroom

I (Perkins) gained insight into exergaming's potential for educators when I taught in elementary/middle school. Because the school lacked a gymnasium, rainy days presented a challenge. Until I introduced exergaming, when the weather was bad I had to take my students into a multipurpose room and "dial down the activity." But this made it difficult to consistently provide the recommended 60 minutes of physical activity that children should have on most days of the week. I successfully experimented with the Play 2 videogame called *Home Run* using Sony Playstation's Eye Toy (released 2005).[12] In this game, a participant's image is projected onto a screen depicting a baseball environment—complete with an infield, outfield, and cartoon opponents. As the virtual pitcher throws the ball, the batter moves his or her arms as if holding a bat, attempting to make a hit. Then he or she runs in place to simulate running to first base. The video camera senses the player's activity and moves his or her onscreen image around the bases. Each base gained adds points to the batter's score. At the end of an inning, the player advances to the next level.

In preparation for having my students "play ball," I set up a dugout complete with chairs, used a real home plate as the batting area, and set the game on single-player mode. When it was a student's turn at bat, others on his or her team would move out of the dugout to stand near home plate, and the other students would move forward one seat. I adjusted the location of home plate based on the age and/or ability of the student—moving the player closer to the Eye Toy made his or her image larger and caused the movements to be picked up more quickly, allowing the player to experience greater success. I have used this game with students from kindergarten to 8th grade, all of whom were successful, involved, and appeared to be having fun. The exergaming activity enabled me to have a more productive and flexible "rainy-day unit."

Dr. John Ratey's book *SPARK: The Revolutionary New Science of Exercise and the Brain*[13] is a must-read for those interested in how physical activity can substantially enhance academic performance and reduce behavioral problems in students.

Exergaming for Students With Special Needs

One great game to use with a student who is temporarily or permanently disabled is the *Wii Sports*[14] video game by Nintendo Wii (released 2006). This game uses virtual-reality "Mii" characters designed by the game player to engage in five different sports: baseball, bowling, boxing, golf, and tennis. These games are fun for all ages, can be a great way to learn the rules of each sport, and offer an alternative for children and adults who cannot participate in group activities. In fact, Wii bowling leagues are becoming popular with senior citizens.[15] Using the Wii bowling game, individuals can compete against classmates or in online leagues. These Wii tournaments can be scheduled during breaks or as part of a class activity, using a station rota-

tion strategy. Wii bowling is especially well suited for at-risk and physically challenged students.

Multigrade schools may well be the venues that benefit most from incorporating exergaming into their curriculum because many of these schools do not have a gymnasium or a physical education teacher. Exergaming's greatest benefit in a small-school setting is its capacity to adjust for ability, age, and physical size of players.[16]

Usually, even students who do not participate in traditional sports show an interest in exergaming activities, and exercise time can be divided evenly among students. Also, the teacher can set up multiple stations to be used both for instruction and after-school activities. Most systems allow up to four players to be active at the same time, so small-group assignments work well. Multiple stations require additional technology and setup time but, depending on the game, can be helpful in getting more students involved.[17] Teachers using exergaming stations can coordinate the game with the physical education lesson.

This does not, of course, imply that computer games should replace the physical education teacher! This would be no more logical than having Google replace the history teacher. What I am suggesting is that exergaming can help students behaviorally, academically, and—especially—physically. According to Judy Shasek: "Regular participation in physical activity delivered in the exergame form benefits students and in turn teachers in a very positive way. At risk students and those challenged by engagement and focus in the learning process improved through regular physical activity breaks."[18] The ideas listed above for multigrade classrooms will also work for teachers in larger schools.

My prior success using exergaming at the elementary and middle-school levels encouraged me (Perkins) to try it with older students. I have integrated exergaming units into the curriculum for small physical education classes at both the high school and collegiate levels. I also developed a self-directed college-level physical education class that included the use of exergaming technology. Students wrote their own exercise programs (complete with activity levels), reported weekly over the Internet on agreed-upon milestones, completed a research paper, and made a presentation about their accomplishments. Interest levels were high because students chose what they wanted to do (with teacher approval). Exergaming's Wii Fit program was used in the self-directed class both because of personal choice and circumstances that necessitated creative solutions for at-risk and special-needs students. The self-directed physical education class incorporated the Wii Fit program.

I have seen firsthand, as Shasek claims, that exergaming excites and motivates students.[19] Its versatility is a major asset.

Physical activity stations can be set up for students to rotate through during free time or when the teacher is giving instruction to another class.

Finally, rules and techniques can be adjusted to the learner's and teacher's capability. As many limitations as a student may have, there are probably twice as many exergaming compensations. If a student can't walk either temporarily or permanently, the game can be adjusted. The mentally challenged can play developmentally appropriate games. The list goes on . . . making it possible to accommodate a wide range of students.

Exergaming Options

An ever-increasing and more-affordable range of exergaming options are becoming available. As previously mentioned, Sony Playstation's Eye Toy, one of the first options on the market, is now one of the more affordable devices. Both Playstation 2 consoles[20] and Eye Toy games are available and reasonably priced online and in many stores. One very nice feature is that the console is also a DVD player. However, games are sparse for the Eye Toy. The Sony Playstation 3[22] combines Move Motion Controllers and a faster Eye Toy camera, a Blu-ray player, more hard-drive space, and better graphics. The new features make this system a credible option but give it a heftier price tag.

Three excellent resource people for further information about using technology to promote physical activity are Ernie Medina, Judy Shasek, and Bonnie Mohnsen.[21]

The system that has received the most publicity for its age-appropriate exercise games is the Nintendo Wii. While this console has the most games and accessories available at the current time, and a price that falls between Playstation 2 and 3, it does not have DVD capability.

Xavix,[23] a cartridge-based system that is comprised of sports games with peripherals, is probably the least-known of the game systems I've investigated. It is also the least expensive to purchase, with a recommended price of $79.99. It is a good system, but I have misgivings about its longevity in the exergaming market. (See the photos above at right.)

Probably the newest system is Microsoft's Xbox 360's multisensor camera accessory, Kinect.[24] Microsoft has produced some remarkable and amazing games. Kinect games have some of the best graphics available, and its cost is comparable to that of Playstation 3. Several of Kinect's sports games do not require controllers; the user becomes the controller through his or her body movements. For example, in playing volleyball in the Kinect system, the player jumps and uses arm motions to "spike" the ball.

When buying exergaming hardware and software, plan to spend between $200 and $500 for a new system with exercise components and games. (The equipment is coming down in price as new technologies emerge.) If this price tag is too high for your school's budget, used equipment is available. Companies may be willing to provide equipment at a reduced cost for educational institutions or on a promotional basis. Given these options, exergaming can be affordable for all.

The exergaming products with accessories can be played on most TVs and video projectors. If you use a projector, you will also need a large, reflective screen or light-colored wall on which to project the images. Be sure to provide a sufficiently large, nonskid, obstacle-free space for students to perform the actions required by the games.

Setup usually takes only about 30 minutes or less, but don't underestimate the time needed to acquaint yourself with the system and to plan activities. Adequate preparation time will ensure a smoother implementation and more quality instruction time. Be sure to consider the ratings on games and their subject matter prior to purchasing them.[25]

With the rapid advances in exergaming technology, the available exercise options are also expanding. Researching what is available and affordable is an essential part of integrating this device into your curriculum.

Exergaming can be an effective tool for fighting obesity and

in stimulating student interest in exercising, while enriching the teacher's options for integrating physical activity in the curriculum. Teachers who integrate exergaming into the overall curriculum can bring the benefits of exercise, activity breaks, improved interest, and versatility out of the physical education realm and into the classroom.[26]

Exergaming's flexibility will spark interest even in the activity-resistant student and provide broader options for teaching young people with special needs. When you see how students' interest and excitement about exercise and learning can be stimulated by exergaming, you will surely want to include this versatile tool in your classroom planning. ✎

This article has been peer reviewed.

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Robert K. Thomas, Ed.D., *earned his doctorate at Boston University in Human Movement. He has taught for 27 years (four in K-12, and 23 at the college/university level). He enjoys exergaming and has attended several national conference presentations and workshops on using exergaming with school-aged and senior populations. Since 2001, Dr. Thomas has chaired the Health and Exercise Science Department at La Sierra University (Riverside, California) and recently served as the Coordinator for the Physical Education and Fitness issue of the* Journal.

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16. Evaluations of exergaming programs for various uses, including education, as well as studies of their use with children can be found on various Internet sites, such as the Exergame Network: http://www.exergamenetwork.org; and MedPage Today ("Exergaming Provides Real Exercise for Kids"): http://www.medpagetoday.com/Pediatrics/General Pediatrics/25226. Accessed September 22, 2011.

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23. Xavix game system: http://www.xavix.com. Accessed October 3, 2011. Xavix®PORT's console has a variety of sports games, each of which has its own cartridge. Some games also have their own peripherals, which must be purchased separately.

24. Xbox Kinect game system: http://www.xbox.com/en-US/. Accessed October 3, 2011.

25. The rating system for exergaming programs is as follows: E (Everyone), E 10+ (10 years of age or older), T (Teen), and M (Mature). While the ratings for these types of programs are primarily related to physical ability, some games (particularly the Mature and some Teen ones) may contain content, themes, or language that are objectionable. E and E (10+) games are usually OK. Teachers should preview all games before buying them, although most sports games are safe. To evaluate a game, go to YouTube, and type in its name. Watching the preview will help you make an informed decision about the game's suitability for your students and your curriculum.

26. Judy Shasek, personal communication to Robert Thomas, January 17, 2011.