

Let's play with exergames!

Yoonsin Oh • yoonsinoh@gmail.com

Ph.D. Candidate at University of Wisconsin-Madison

Exergaming comes from the idea of being physically active while playing video games. Although the first half part of the word implies exercise, exercise needs intention to maintain and improve physical fitness and performance in a repetitively structured format (Caspersen et al., 1985). Exergaming doesn't use this definition but is rather a physical activity that is more active than sedentary.

People have used various terms for exergaming and exergames: exertainment, dance simulation video game, interactive video game, activity promoting video game, active video game, (kin)aesthetic video gaming, and physical activity-change game. I prefer to use the word exergaming because this is a catchy word and is the most commonly used term among researchers and the media.

Exergame Examples

World Class Track Meet and *Dance Aerobics* were two of the first video games to use a stepping interface. Players stepped on numbered circles to run, jump, and do step aerobics in the games, in the process increasing their aerobic energy expenditure. Modern versions include the popular *Dance Dance Revolution (DDR)* series where players dance to music with complex stepping patterns on dance pads.

The Playstation 2 popularized the Eye Toy game series including *Kinetic*, *Play*, and *Antigrav*. It uses a camera that recognizes players' limb movements. It requires good lighting for the camera to operate well. The Wii has a similar camera for *Your Shape*.

The Wii remote is the primary controller for Nintendo's Wii console. It has an accelerometer and tracks motion to capture players' hand and arm movements. For example, *Wii Sport Tennis* requires players to mimic tennis swings rather than only pushing buttons. The Wii balance board is a related accessory controller made for *Wii Fit*. Because it uses multiple pressure sensors to recognize players' balance, many of the *Wii Fit (Plus)* games use balance and weight focused activities including yoga and basic step aerobics.

My Weight Loss Coach is one of the first modern games to use a pedometer, but the pedometer is very large. *Personal Trainer: Walking* use a smaller activity meter that measures steps and records times to show a daily rhythm. Users can't see how many steps they have taken without uploading the data to a game cartridge. *Pokémon HeartGold & SoulSilver* develop pedometers into a mobile game. It allows players to use their steps to play games with a carried pokémon (character).



Possible Uses in Education

1. Develop curricula using exergames*
2. Make exergames (e.g. *DDR*) available to students during physical education class, recess, and afterschool programs
3. Use exergames for social activities
4. Promote physical activity using exergames (e.g., *Personal Trainer: Walking*) through competition

*Researchers from University of Calgary develop a curriculum for upper elementary and middle school students using Wii Fit, more info from www.ucalgary.ca/exergaming/

Virtual Trainers

Exergames often use virtual trainers (whether based on real people or not) to guide player activity. Some examples are *Yourself!Fitness*, *Jillian Michaels Fitness Ultimatum 2009 & 2010*, *The Biggest Loser*, and *Daisy Fuentes Pilates*. Excessive use of trainers at the expense of gameplay loses the social benefits of a physical gym and more closely resembles an exercise video.

Research

Dance, Dance, Revolution

Research suggests that children playing *DDR* can meet the minimum recommendation to improve or maintain cardiorespiratory fitness set by the American College of Sports & Medicine (Tan et al., 2002; Unnithan et al., 2006). This means that children can have health benefits by playing *DDR* for an hour everyday.

Wii Sports – Bowling, Tennis, & Boxing

Graves et al.'s (2007) found that children's energy expenditure significantly increased when they play *Wii Sports Bowling*, *Wii Sports Tennis*, and *Wii Sports Boxing* compared to playing the game *Projet Gotham Racing 3*.

Wii Sports Boxing can provide moderate intensity of aerobic physical activity by measuring 13 college students' VO₂ and heart rates while they play the videogame (DiRico et al., 2009). DiRico and colleagues also found that playing *Wii Sports Tennis* and *Wii Fit Basic Step Aerobics* can provide physical activity of light intensity.

EyeToy video games – Play 2, Groove, AntiGrav

Maddison et al. (2007) found that children's energy expenditures were significantly greater when they played *DDR* and Eye Toy video games such as *Knockout*, *Homerun*, *Groove*, and *AntiGrav* compared to sedentary video games. The authors found that children's energy expenditure during exergaming is similar to moderate to vigorous physical activity such as walking, skipping, jogging, and stair climbing.

More information on Exergaming

- Exergaming Lab blog: <http://exergamelab.blogspot.com/>
- Games, Learning, and Society: <http://www.gameslearningsociety.org/>
- Games for Health: <http://www.gamesforhealth.org/>
- Interactive Fitness and Exergaming: <http://exergaming.pbworks.com/>
- Yoonsin's exergaming blog: <http://www.yoonsinoh.org/>

References

- Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public health reports*, 100(2), 126.
- de Vries, S. I., Simons, M., & Jongert, T. W. A. (2009). Energy expenditure of active computer-games. Presented at the annual American College of Sports Medicine meeting, Seattle, WA, May 27-30.
- DiRico, E., Davis, K., Washington, C., Galvanin, E., Otto, R. M., and Wygand, J. (2009). The metabolic cost of an interactive video game. Presented at the annual American College of Sports Medicine meeting, Seattle, WA, May 27-30.
- Graves, L., Stratton, G., Ridgers, N. D., & Cable, N. T. (2007). Comparison of energy expenditure in adolescents when playing new generation and sedentary computer games: cross sectional study. *British Medical Journal*, 335(7633), 1282.
- Maddison, R., Mhurchu, C. N., Jull, A., Jiang, Y., Prapavessis, H., & Rodgers, A. (2007). Energy expended playing video console games: an opportunity to increase children's physical activity? *Pediatric exercise science*, 19(3), 334.
- Tan, B., Aziz, A. R., Chua, K., & Teh, K. C. (2002). Aerobic demands of the dance simulation game. *International journal of sports medicine*, 23(2), 125.
- Unnithan, V. B., Houser, W., & Fernhall, B. (2006). Evaluation of the energy cost of playing a dance simulation video game in overweight and non-overweight children and adolescents. *International journal of sports medicine*, 27(10), 804-809.

Photo Credits

- DDR pad: <http://zaitang.wordpress.com/2009/06/07/interactive-seat/>
- Eyetoy Camera: <http://www.entremaqueros.com/bitacoras/urian/wp-content/img/2009/11/eyetoy.jpg>
- Wii Remote: <http://www.whitedog.co.uk/catalog/images/wii-mote.jpg>
- Wii Balance Board: <http://www.besportier.com/archives/nintendo-wii-balance-board.html>
- Pokéwalker: http://www.andriasang.com/e/blog/2009/06/08/pokemon_gold_silver/