

Effects of exergaming and the physical education curriculum

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Abstract:

From an education perspective, play has always been viewed as an integral part of learning experiences¹ and physical activity is a major component in many games that children play. In recent two decades, rapid technology development has brought the playground into living rooms, video-TV screens, desktop and laptop monitors, and mobile devices. While most video-based games are sedentary, some do require players to physically engage in the game, thus “exergaming”. Compared with sedentary games, exergames clearly demonstrate potential to increase players' energy expenditure,² which presents an advantage in engaging children in physical activity while playing video games. In recent years, exergames have entered physical education gymnasias gradually. It is hoped that exergames will help attract students to physical activity and enhance activity experiences at moderate and vigorous intensity levels. Moving exergames from the home-play environment to physical education implies an important hypothesis: exergaming experiences will provide students with educational benefits equal to or greater than those they likely experience in physical education. To examine this important hypothesis, the *Journal of Sport and Health Science* has organized four articles in this special issue to provide insights from empirical and conceptual perspectives. Three of the four articles are data-based research reports conducted in authentic physical education settings where the effects of exergaming on children balance ability, physical activity, and motivational correlates were compared with those of typical physical education. One article is a conceptual analysis of exergaming potential as part of the 21st century physical education curriculum.

Keywords: editorial | physical education | exergaming | curriculum

Article:

*****Note: Full text of article below**



Editorial

Effects of exergaming and the physical education curriculum

From an education perspective, play has always been viewed as an integral part of learning experiences¹ and physical activity is a major component in many games that children play. In recent two decades, rapid technology development has brought the playground into living rooms, video-TV screens, desktop and laptop monitors, and mobile devices. While most video-based games are sedentary, some do require players to physically engage in the game, thus “exergaming”. Compared with sedentary games, exergames clearly demonstrate potential to increase players’ energy expenditure,² which presents an advantage in engaging children in physical activity while playing video games. In recent years, exergames have entered physical education gymnasias gradually. It is hoped that exergames will help attract students to physical activity and enhance activity experiences at moderate and vigorous intensity levels. Moving exergames from the home-play environment to physical education implies an important hypothesis: exergaming experiences will provide students with educational benefits equal to or greater than those they likely experience in physical education. To examine this important hypothesis, the *Journal of Sport and Health Science* has organized four articles in this special issue to provide insights from empirical and conceptual perspectives. Three of the four articles are data-based research reports conducted in authentic physical education settings where the effects of exergaming on children balance ability, physical activity, and motivational correlates were compared with those of typical physical education. One article is a conceptual analysis of exergaming potential as part of the 21st century physical education curriculum.

Two of the empirical studies examined the impact of exergaming based on the change of the outcome variables. In the first study, Sheenban and Katz³ studied the change in balancing ability in fourth grade students ($n = 64$) as a result of experiencing a 6-week long exergaming program or an equal length Agility, Balance, and Coordination (ABC) program or a typical physical education program. The

outcome variable, balance, was assessed pre- and post-intervention using a portable device (HUR BT4™) that assessed postural stability in trace length, the distance that a participant shifted from the center of pressure over a 20-s period while performing balance tasks. Data were analyzed using analysis of covariance to control for the impact of initial difference on the intervention outcome. The results showed that the exergaming and ABC interventions yielded significantly greater balance development than the typical physical education; but no difference was found between the exergaming and ABC conditions.

In the second article, Sun⁴ examines the change in situational interest and physical activity level by following a group of fifth grade students ($n = 69$) in an exergaming unit and a conventional aerobic fitness unit. In their classes, the participating students experienced a counter-balanced intervention where a half of the participants experienced an 8-station exergaming unit, the other half the conventional aerobic fitness unit. When each group completed their respective unit, they switched to the other condition to continue. Situational interest was measured using the validated Situational Interest Scale⁵ and physical activity intensity was measured in metabolic equivalent (METs) using the RT3 accelerometers. Results from the multivariable analysis of variance (MANOVA) showed clearly that situational interest was decreasing over time. Although physical activity in exergaming in all measurement phases (pre-, post-, and follow-up) did not reach the moderate intensity level (3 METs or higher), the students were becoming more and more active in the exergaming unit over time.

The third study, by Gao et al.⁶ compares children’s ($n = 59$) physical activity levels, self-efficacy, and enjoyment between their dance-exergaming experiences (Dance Dance Revolution (DDR)) and aerobic dance experiences in physical education. Data were collected from four sessions each of which offered 15 min DDR followed by 15 min aerobic dance in alternating sequence. Physical activity was measured using pedometers, self-efficacy was measured using a 3-item Likert-type scale, and enjoyment was measured using a 5-item Likert-type scale. The results from ANOVA and MANOVA showed that the students rated self-efficacy and enjoyment higher for the DDR sessions than in the aerobic dance sessions; but they spent

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significantly more time engaging in moderate and vigorous intensity physical activity in the aerobic dance sessions.

The three studies provide strikingly similar findings. Compared with the typical physical education, exergaming demonstrates a superior edge in enhancing students' interest-based and competence-based motivation; but exergaming cannot provide opportunities equal to or better than the typical physical education for children to develop specific ability or to be active in class. Through careful theorizing, Ennis⁷ provides an insightful critique of the findings and takes the reader beyond the tangibles evidence to a new level of understanding. By framing current physical education curricula in three distinct programming paradigms, recreational, public-health, and educational, Ennis further examines the implications of the findings based on an expanded review of the literature. She challenges physical education curriculum designers, researchers, and teachers to consider the utility of exergaming not only from the motivational perspectives where all three programming paradigms endorse, but also from a learning perspective where the ultimate goals of physical education lie. Drawing upon the theoretical articulation of the role of serious gaming in situated learning,⁸ Ennis directs the reader's attention to a more critical question that needs immediate scholarly attention: what should we do then, after we use exergaming or similar experiences to help students become motivated? As she points out, each individual may arrive at a different answer based on the programming paradigm one operates from. Because the research on exergaming in relation to physical education outcomes is still in its infancy, the opportunity to examine exergaming and its impact is abundantly available and can be rather fruitful.

I hope reading this group of outstanding articles can be intellectually stimulating and engaging for you as playing exergames for most children! I also hope that the articles will

lead you to a deeper thinking about the future of physical education in terms of ways it will enrich children's life and development. If one of the hopes is actualized, then the special issue will have served its purpose.

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