

EXERGAMES, MOTOR SKILLS AND SPECIAL EDUCATIONAL NEEDS

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Review paper

Abstract

Recent scientific literature has shown that exergames present numerous potential advantages in well-being promoting. The scientific community has, initially, mainly considered exergames in relation to the contribution they can make as a weapon against the sedentary lifestyle. Recently, scientific literature shows that exergames could provide the stimulus for engagement to those students who have started to lose interest in more traditional forms of physical activity. Finally, researchers have explored other fields, showing how the gaming activities based on the entire body can be beneficial on the cognitive level in autism or enhance brain activity in older age. The results of the literature review encourage us to consider the exergames as a potentially effective tool in education in the presence of students that present Special Educational Needs

Key words: exergames, special educational needs, physical literacy

Introduction

"Exergaming is the combination of exercise and video games" (Bogost, 2007). Exergames involve the whole body of the player in the human-machine interaction process (Di Tore & Raiola, 2012b). The recent scientific literature has shown that exergames present numerous potential advantages in the area of promoting of the well-being. The major strengths, which can positively influence skills, attitudes and behaviors regarding health and exercise, are the fascination that these games have on players (and thus increasing motivation), and the opportunities they offer for active learning, experiential exploration of concepts and skills, for customized feedback and personalized instruction, and for learning through social interactions. The scientific literature has, initially, mainly considered the exergame in relation to the contribution they can make as a weapon against the sedentary lifestyle (Chamberlin & Gallagher, 2008). "Exergames are a commonly accepted method of encouraging people to attempt a higher level of physical activity to promote better health for those with high levels of sedentary screen time" (A. Whitehead, Johnston, Nixon, & Welch, 2010).

Motivation to be "active" is a crucial component of physical literacy (Sheehan & Katz, 2012) and, both in education and in the agonistic field, this component should have a fundamental role (Gaetano, 2012a, 2012b). Physical literacy is the term by which we define "motivation, confidence, physical competence, knowledge, and understanding that individuals develop in order to maintain physical activity at an appropriate level throughout their life" (M. Whitehead, 2010). The ability to establish and maintain good physical literacy largely depends on the experiences that occur in relation to the involvement of an individual in physical activity, especially at a young age, which can have a substantial impact on the behavior, capacity and participation.

In this way, involvement in gaming of the entire player's body is a powerful tool in the longstanding battle against sedentary lifestyle (Chamberlin & Gallagher, 2008). According to Widman, McDonald & Abresch, "exergaming and interactive fitness activities could provide the stimulus for engagement to those students who have started to lose interest in more traditional forms of physical activity and reengage them towards lifelong physical activity" (Widman, McDonald, & Abresch, 2006). Based on the positive results obtained, researchers have explored other fields, showing how the gaming activities based on the entire body can be beneficial on the cognitive level in autism or enhance brain activity in older age: "Exergames boost brain function among seniors" (Anderson-Hanley et al., 2012).

Specific works has been devoted to the topic of edu-exergames, both in terms of teaching (learning exergames as educational support of motor and sports activities (Di Tore & Raiola, 2012a), both in terms of motor assessment (methodological aspects and characteristics of the instruments used (Sgrò, 2015). Movement-based gaming technologies are gaining higher visibility in physical education and in its various educational settings (Hayes & Silberman, 2007). One of the reasons related to the eligibility of such solutions by educators can be attributed to the fact that students find such funny environments, motivating (Dickey, 2005) and are able to offer many opportunities for physical activity involvement (Fogel, Miltenberger, Graves, & Koehler, 2010; Sgrò, Schembri, Nicolosi, Barresi, & Lipoma, 2013).

Exergaming and disabilities in educational contexts: a literature review

While these concepts may be considered important from a psychological point of view (enjoyment) and health-enhancing factors (physical activity), researchers agree that there has been relatively

little study about the educational value of technologies within the gaming industry of physical education (Perlman, Forrest, & Pearson, 2012). Much of the literature on video gaming in physical education is divided into practitioner article", aimed at understanding the potential use of these solutions for students (Cai & Kornspan, 2012; Hayes & Silberman, 2007; Pill, 2010), and in empirical evidence focused on studies about the influence that gaming technologies really have on students related fitness components (Fogel et al., 2010; Lager & Bremberg, 2005; Marshall, Biddle, Gorely, Cameron, & Murdey, 2004).

Taking advantage of the practitioner-based work, we can go back to the idea that the movement-based technologies have the potential to enable much more efficient teaching and, with Hayes, are capable of supporting "the broader goal of encouraging students to become more knowledgeable, confident and enthusiastic about engaging in movement activities" (Hayes & Silberman, 2007). From a fitness perspective, the gaming technologies provide the opportunity for students to engage in behaviors that positively affect the level of fitness as well as physical activity (Fogel et al., 2010; Krisberg, 2012; Lager & Bremberg, 2005; Marshall et al., 2004). The results showed that students have spent much more time in activities characterized by movement-based gaming lessons rather than the traditional classroom lessons. Each of the researchers mentioned the indication that using gaming technologies in physical education courses provides students with the opportunity to develop different aspects of the individual fitness (Di Tore, 2014, 2015; P.A. Di Tore, Discepolo, & S. Di Tore, 2013). The interaction and the relationship between students, learning, exercise and practice is something that needs to be reviewed with respect in specific educational contexts in order to understand how and when the exergame is able to promote physical activity looking to it as a lifelong pursuit (Scrimsher & Tudge, 2003).

Sheehan describes exergaming as a fun, social, and inclusive way for children to be active and holds promise as a tool for the development of physical literacy (Sheehan & Katz, 2012). In rehabilitation, exergames' widespread use in rehabilitative practices is evidenced by the neologism Wiihabilitation, a combination of Wii and Rehabilitation.

This popular field of research refers mostly to the medical area. In education, we must specify that children with developmental or learning disabilities participate in less physical activity and have higher obesity prevalence than other children (Yazdani, 2013). This is due to various factors: "Youth with disabilities may require unusual diets, have limited nutritional options, and use medications such as corticosteroids, which may predispose them to obesity; a large proportion, meanwhile, may lack adequate physical activity (Yazdani, 2013).

According to Liou, nearly 75% of people with disabilities do not participate in enough physical activity to achieve physical health benefits (Liou, Pi-Sunyer, & Laferrere, 2005). It seems clear that the advantage of exergames in motivational terms, as described above, is crucial in the case of disabilities-related lifestyle. Cai & Kornspan (2012) emphasize how the movement-based games have the capacity to support the psycho-motor learning and cognitive motor skills (motor skills) for students with disabilities.

According to Cai & Kornspan, it appears that the use of interactive videogames may be an important way to increase the physical activity of students with disabilities. A main reason that interactive games may be helpful is that the various aspects of the disability may make participation in traditional sports and physical activities difficult but these interactive video games make participation possible. According to Kooiman & Sheenan, exergaming over the Internet can provide students with a social experience that results in increased relatedness between participants versus playing by themselves against a non-player character (Kooiman & Sheehan, 2015).

Altanis, Boloudakis, Retalis, & Nikou proposed an approach, called Kinems, which advocates that special educators should use learning games that via embodied touchless interaction in children with dyspraxia and other related disorders such as autism, Asperger's Syndrome, and Attention Deficit Disorder, they can improve related skills. (Altanis, Boloudakis, Retalis, & Nikou, 2013). Anderson-Hanley, Tureck and Schneiderman showed that "exergaming may be useful for the management of behavioral disturbance and for increasing cognitive control in children on the autism spectrum" (Anderson-Hanley, Tureck, & Schneiderman, 2011).

In particular, "physical exercise has shown promise for decreasing repetitive behaviors in autistic children" (Anderson-Hanley et al., 2011). The study by Anderson-Hanley, Tureck and Schneiderman is the first study in this field. As authors write, "no prior research has explored the behavioral or cognitive effects of exergaming for persons with autism". The results "provide initial evidence that exergaming may be useful for the management of behavioral disturbance and for increasing cognitive control in children on the autism spectrum" (Anderson-Hanley et al., 2011).

Conclusion

Scientific literature shows that exergames could improve learning of sport skills in ecological vision according to phenomenology (Altavilla & Raiola, 2014; Raiola, 2014) and could provide the stimulus for engagement to those students who have started to lose interest in more traditional forms of physical activity (Widman et al., 2006). Moreover, the movement-based games seem to have the ability to support the psycho-motor and cognitive

learning of motor skills (motor skills) for students with disabilities and may be useful for the management of behavioral disturbance and for increasing cognitive control in children on the autism spectrum. The results of the literature review encourage us to consider the exergames as

a potentially effective tool in education in the presence of students that present Special Educational Needs. However, we must specify that no systematic study, based on large-scale data collections, seems to have been published yet.

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VJEŽBANJE KROZ IGRU, MOTORIČKE VJEŠTINE I POSEBNE OBRAZOVNE POTREBE

Sažetak

Nedavna znanstvena literatura je pokazala da vježbanje kroz igru predstavlja brojne potencijalne prednosti u promicanju blagostanja. Znanstvena zajednica je, prvobitno, većinom uzimala u obzir vježbanje kroz igru u odnosu sa doprinosom koje ono može donijeti kao oružje protiv sjedilačkog načina života. U zadnje vrijeme znanstvena literatura pokazuje da vježbanje kroz igru može pružiti stimulans za angažiranje studentima koji su počeli gubiti interes za tradicionalnije oblike tjelesne aktivnosti. Konačno, znanstvenici su istražili druga područja, pokazujući na koji način igraće aktivnosti zasnovane na cijelom tijelu mogu biti blagotvorne na kognitivnoj razini za autizam ili poboljšati moždanu aktivnost u starijoj dobi. Rezultati pregleda literature potiču nas na razmatranje vježbanja kroz igru kao potencijalno djelotvornog alata u obrazovanju u prisustvu studenata koji predstavljaju posebne obrazovne potrebe.

Ključne riječi: vježbanje kroz igru, posebne obrazovne potrebe, fizička pismenost

Received: February 21, 2016

Accepted: August 10, 2016

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