

Exergaming as an Alternative for Students Unmotivated to Participate in Regular Physical Education Classes

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ABSTRACT

With the novelty of exergames, an alternative form of entertainment and exercise emerged especially for physical education (PE). While video games have been historically associated to problems such as obesity, social introversion and aggressive behavior, exergames brought a new perspective in which these cultural artifacts could contribute to people's education concerning the practice of physical activity. This article presents a study about the setting up of an exergame lab focusing on kids and preadolescents who usually show signs of dissatisfaction with PE. The research methodology followed a qualitative observation approach, involving twenty-four students of both genders for three months. Results demonstrated that students who were normally unmotivated to participate in PE classes showed a positive attitude regarding the exergame practices and demonstrated their willingness to collaborate with peers. The study also showed that exergaming provides situations in which students can increase the regularity of their practice of physical exercises.

Keywords: Active Video Games, Collaborative Practices, Engagement, Introversion, Sedentary Lifestyle, Physical Activity, Physical Education, Social Skills

INTRODUCTION

Gaming is a widespread activity in our culture, with millions of people playing video games worldwide. Active games, or exergames, have

been introduced as a way to enable players to use body movement to control the games. As a result, exergames started to be seen as a tool that could contribute to a less sedentary lifestyle with positive effects concerning health-related

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behavior (Baranowski, 2008). But although there is mixed evidence regarding the capability of such games to impact children's fitness according to public health recommendations, it has been suggested that playing active games can contribute to the practice of light to moderate physical activity (Peng, Jih, & Crouse, 2006). Exergaming may also foster a stronger bond among players, reducing social isolation and loneliness (Mueller, Agamanolis, & Picard, 2003). A study about the motivation of children to play a dance exergame showed the preference of kids for the multiplayer and group game play over the solitary practice (Chin et al., 2008).

In Physical Education (PE) Classes, it has also been argued that exergaming engaged participants in longer periods of physical activity than did the standard PE practice (Fogel, Miltenberger, Graves, & Koehler, 2010). It is therefore important to better understand the potential of using such games in formal educational contexts, particularly when exergaming starts affecting school curriculum. In this article we describe a particular experience in the setting up of an exergame lab to complement PE classes for students unmotivated to participate in regular practices. The use of exergames in the lab has been analyzed from a qualitative perspective, focusing on the practice of physical activity and development of social skills.

Physical Education, the Practice of Physical Activity and Development of Social Skills

Physical Education is the discipline in school curriculum that targets the practice of physical activity. Research results have demonstrated that school age children should engage daily in moderate to vigorous physical exercise involving a variety of activities (Strong et al., 2005). Based on such evidence, the US Department of Health and Human Services (2009) claims that comprehensive school-based physical activity programs should help youth meet physical activity needs, stressing that PE practices should be enjoyable and engage kids in friendly interaction.

Several studies have demonstrated the relationship between physical activity and quality of life. Active individuals tend to be healthier, more positive about work, and deal better with everyday stress (Weinberg & Gould, 2011). Stone & Klein (2004) have also concluded that people who exercise frequently not only improve their health and fitness, but they also develop a sense of pleasure and strength, which has positive implications on other aspects of their lives.

Such results indicate the importance of setting up effective PE programs that engage all students in the practice of physical activity. In this respect, new alternatives for the practice of physical exercise should be proposed, in compliance to US Department of Health and Human Services (2009) recommendations that PE practices should be enjoyable for all students. Not only enjoyment may promote an increased level of physical activity (Dishman et al., 2005), it may also influence long-term adherence (Williams et al., 2006). And although student attitude toward Physical Education is generally positive, individual differences may lead students to be unmotivated to participate in classes (Stelzer, Ernest, Fenster, & Langford, 2004). Therefore, it is important that PE curriculum incorporates different types of activities that can be perceived as enjoyable by all students. This has been the proposal of the project presented in this article, which has focused on the setting up of an exergame lab to complement regular PE classes.

Besides health-oriented benefits, well structured PE programs may contribute to the improvement of children's social skills, engaging them in social situations that involve cooperation, assistance, sharing and solving problems (Gregoriadis, Grammatikopoulos, & Zachopoulou, 2013). Physical education programs may provide an appropriate scenario for social skills to be addressed within the school (McHugh, 1995).

In this article we have focused on the use of exergames as a means to promote the practice of physical activity and contribute to the development of social skills. By focusing

on these aspects we attempted to understand how the activities proposed at the exergame lab could engage unmotivated students in practicing physical activity and interacting with their peers.

Exergames in Physical Education Classes

Most of the scientific literature related to exergaming and education focuses on the games' potential to improve students' physical health, to involve them in social activity and improve their academic performance (Staiano & Calvert, 2011). However, we wanted to investigate in which ways such tools could also benefit students who are usually unmotivated to participate in regular PE classes.

Recent research results have shown that exergames may have a positive effect on body mass index and body composition in overweight and obese children (Maddison et al., 2011). Researchers have also tried to show how such games could get users to participate in sports and other movement based activities (Fery & Ponserre, 2011), or how they could contribute to the development of motor skills in a golf simulation (Hayes & Silberman, 2007). On the other hand, it has been argued that exergames cannot be a substitute for 'real sports' and that they don't provide long-term motivation for sustainable physical activity (Wiemeyer, 2010). Such disparate positions towards exergaming call for further investigation on how such games may be used in formal educational settings.

Several studies are being conducted in this respect, some of them with conclusive results regarding the benefits of exergames. For instance, Shayne, Fogel, Miltenberger and Koehler (2012) compared the effects of exergaming and traditional physical education on physical activity among four active children. While in the PE class the teacher conducted the activities according to the regular lesson plans, in the exergaming lab the students played with a series of games according to certain rules established for the practice. Results showed that exergaming produced higher percentage of physical activ-

ity and represented a different opportunity to engage students in physical activity.

Sheehan and Katz (2013) have also demonstrated the feasibility of using exergames as a practical resource in PE classes. Their study, carried out with 64 students over a 6-week period, focused on the development and assessment of postural stability. The authors showed that students who worked with the exergames improved their postural stability significantly compared to those in the regular PE class. Sun (2013) conducted a different study by examining the effect of exergaming on situational interest and on the intensity of children's physical activity during PE classes. Results showed that, although situational interest dropped over time, children's physical activity intensity increased.

Ennis (2013) stresses that PE programs have been adopting different approaches towards the development of their curricular activities:

- **Recreational:** This type of PE program is described by limited skill and tactical development. In such programs, a few more skilled students engage in moderate intensity activities, while most students engage in light activity.
- **Public-Health Oriented:** These programs are based on moderate to vigorous physical activity (MVPA), and children are often expected to meet MVPA guidelines.
- **Educational:** These programs focus on physical, cognitive and affective learning (skill, sport, fitness, etc.), cognitive learning (sport performance, fitness principles), and affective learning (cooperation, leadership, goal-setting, and intrinsic motivation).

Although the educational approach is the one that states explicitly the social/affective role of PE classes, all of them are intended to promote the integration of students through sports, physical and recreational activities. It is part of the PE curriculum to develop different competences in students, including those related to group work, such as: leadership, collabora-

tion, solidarity and integration. In this respect, a few studies have tried to show how exergames may also contribute to PE practices involving the development of affective skills. Lieberman (2006) described different factors that could foster learning through games, including features that make them a suitable means for social interaction: social recognition for game skills, social interaction to enhance learning and game communities as learning environments. A study with a dance simulation game also showed that children participating in multiplayer activities enjoyed interacting with their peers and had a lower dropout rate, playing approximately twice as much as students who played the game on their own (Chin et al., 2008).

In the study described here, a particular experience with an exergame lab set up as a complementary space for PE classes is presented. We describe the lab as an educational space targeted mainly to kids and preadolescents unmotivated to participate in regular PE classes. The lab's goal has been to foster the practice of physical exercises and to enable children to develop their social skills.

METHODOLOGY

Research on exergames often follows a quantitative approach, focusing on how such games may influence health and body composition factors. Here we have opted for a qualitative approach to help us understand how structured practices with these games could influence the engagement of students who were unmotivated to participate in regular PE classes. This section presents our experience with the setting up of the exergame lab in an elementary school, the selection of students to participate in the lab, as well as the evidence about the use of the exergames by the participants. The PE teachers and instructors that collaborated with the project were also interviewed regarding student behavior and changes they were able to observe.

The Exergame Lab

The Exergame Lab was set up in an elementary school, equipped with one Wii/Wii Fit and one Xbox/Kinect console, but only the Xbox/Kinect was used for the purpose of this research. Two commercial titles were selected for the project (Kinect Sports and Kinect Adventures) because of the wide range of activities they could support. They contained sports games (table tennis, track and field, beach volleyball, bowling and boxing) as well as other games that required the player to perform different body movements such as jumping, kicking, dancing and stomping.

The Participants

Twenty-four students took part of the exploratory study, twelve girls and twelve boys. The meetings lasted one hour, allowing a maximum participation of four students per group, according to age group: 8-9, 10-11, 12-14 years old. The participants of the project were selected by a committee composed by the PE pedagogical coordinator, two members of the university research team involved in the project and four PE teachers. The main facet used to select students has been their unwillingness to participate in the classes, a problem with a multidimensional nature that may involve factors such as sedentary lifestyle, obesity, motor difficulties, introversion, or simply a discontentment with the activities proposed in the regular classes. The parents of the students who participated in the research read and signed an informed consent allowing their kids to take part in the project. The students also read and signed the same informed consent, agreeing to participate in the research.

In the words of one of the PE teachers, the students that were indicated to participate in the project were the ones

... who perhaps did not like a lot [PE classes], who were a little reluctant to participate in the regular PE classes. We [...] sent students who we thought could have better gains with the games, either from a motor or a social per-

spective. Or simply for the practice of physical activity. Because at the moment [the students] are playing, no matter which game, they are moving their bodies. [...] A student who had a particular physical problem [...] was also sent to participate in the project. He had difficulties with activities involving too much impact.

Another PE teacher also mentioned that

... the students who were indicated to the project were the ones who, for whatever reason, try not to participate in the PE class. [...] Some children do not like running, it is not part of their daily life and it does not give them pleasure. [The exergame lab] was a way to motivate them in an activity that was different from the more common PE practice of collective games.

The Practices

During a period of three months, two researchers were involved in the collection of data. One was the instructor promoting the activities and lessons with six different groups, from the ages of eight to fourteen. The second researcher took notes about the interaction of students and the practices carried out during the classes.

Regular PE classes happened twice a week, so the students who participated in the project missed one of these classes to join the exergame lab. Therefore, participants had one regular PE class per week and the other involved practices with exergames.

The structure of the classes was organized to offer activities to four students at a time, using the commercial titles Kinect Sports and Kinect Adventures. In most of the initial practices, students were asked to play particular games chosen by the instructor with the goal of getting them acquainted with all the games available, and also to vary the practices in terms of level of physical intensity. After the first month, students were allowed to choose the games they would play from time to time.

The non-participant observer (second researcher) did not get involved in the activities, his role was solely to register interactions among

students, noting down dialogues and reporting situations that were evidence of engagement and collaboration between participants. He collected notes through written reports of what he could hear, see and experience during the moment of observation. The participant researcher interacted with the students, explaining the games and giving them tips on how to use them.

It was possible to observe the dynamics and different types of social interaction among the participants. Social interaction has been considered here as the actions and practices of two or more people mutually oriented towards each other. Interpersonal interactions are important for emotional and psychological well-being and can lead students to healthier behavior and more appropriate choices (Moore & Mellor, 2003).

Relevant behaviors/actions observed during the meetings with the students have been reported here. The non-participant observer collected data during the meetings with and categorized it into two distinct classes. The first was related to the engagement of the participants in the practice of physical activity, and the second was concerned with manifestations of social interaction and collaboration between the students. Each of these categories is detailed in the following.

Engagement in Physical Activity

In an educational context, Chapman (2003) defines engagement as the intensity and emotional quality with which students get involved in learning activities. Students who are engaged in the activities put a lot of effort and concentration in the task, showing behavioral involvement. They demonstrate enthusiasm, optimism, curiosity and interest. The opposite of engagement is disaffection. Children who are not happy are passive, they do not show any effort to carry out the proposed tasks and they give up easily when facing a challenge. Following these definitions, we have considered evidence of engagement any verbal or behavioral manifestation indicating enthusiasm and concentration in a given task. Below there are a few examples of students'

behaviors and statements indicating engagement in the activities proposed:

- Student M said enthusiastically: “Strike, yes! One more! I am really good in this game”. A little later he asked if he and his classmates could play again the game (bowling).
- Student N (girl) expresses her joy: “wow, this soccer game is really cool because I have the chance to play it” (making an allusion to the lack of possibilities girls have to play this particular sport)
- Student O meets the Kinect lab instructor at school and says: “Today we have Kinect lab? Great, I love it when we play, I’ve been waiting for this all week! Can we play the sports game?”
- Student P initially mentioned she would not participate in the activity as she was not feeling very well. However, after seeing her classmates play, she got motivated and ended up by joining the group and playing Space Bubbles (Kinect Adventures).

Although participants of the exploratory study were usually not satisfied with regular PE classes, they were interested in the practices with the exergames. It was clear from the very beginning of the project that the students were in total ease with the use of the games. The data collected during the three months also showed that students who joined the project were motivated, curious and interested, often making questions about the games, the activities, the sports and exercises that had to make. Although interest may be a transitory state of mind that depends on factors such as novelty and environment (Hidi & Harackiewicz, 2000), the data collected for three months showed a more persistent behavior regarding the students’ enthusiasm with the classes at the lab.

In the interviews with the PE teachers and Exergame Lab instructors, part of their speeches gave evidence of the students’ involvement with the exergaming project. One of the PE teachers said:

The students thought, in the beginning, that they would run away from PE classes to play videogames, [...] but during the course of the project, we could see they were motivated.

We could also see a positive effect in some of the students who were selected to participate in the research. We started to sense a stronger motivation [from the part of these students] to participate in the regular PE classes. It may have helped these students to get to know their own bodies. If you consider a boy who hasn’t had a very active life, a student who used to spend a lot of time indoors, he started to experience body movements, to move, play, punch (referring to boxing games). [...] And perhaps he started to discover his own body. At this moment he started to participate a little bit more in the PE classes. [...] We were commenting the other day about a student who had started in our school, very shy, always on his own. We sent him to participate in the project and his improvement was visible. We cannot say for sure that it has been the exergame lab, but it would be too much of a coincidence [...] we no longer have the project, but he started the year very well. He has technical, motor limitations, but today he tries to participate in [the classes] in his own way. I do believe that these results are related to the work that has been done at the exergame lab.

Such a comment is an evidence of the potential of the exergame lab to help students who may have difficulties in benefiting from regular PE classes.

Social Interaction and Collaboration

Through the observation of how students interacted with one another, we registered how collaboration and conflict resolution happened between kids. Despite small interpersonal conflicts in the practices because of points and comparisons between participants (especially among the younger students from 8 – 9 years-old), it was notorious the collaboration among students during the classes. For instance, it was easily noticeable the natural will of the students

to help their classmates that showed difficulty in playing. Support was usually given with verbal instructions and logical rules about the games. Besides, the attitude of more confident students served as a model for the ones that needed more support for the activities. It was also noticeable that new students started to collaborate more during the classes. Such collaboration had a positive impact in all the students who had difficulty in the first classes. Little by little they started to feel more integrated in the group and confident in doing the activities proposed. It was possible to observe that, in a small group, it was easier for the students to get in touch with each other.

Encouraging remarks made by participants were considered as evidence of social interaction:

- Student F motivated other classmates to get more points playing Bowling by constantly saying: “Come on, you can do it!” “You will get high scores, do your best!”
- Student G cheered for the other classmates while waiting for his turn to play: “Go on, you can do that.”

These types of remarks were very frequent during the exergame classes. Another evidence supporting the fact that the practices in the lab in small groups promoted social interaction is that, little by little, students started to self-organize their groups to play the games. They started to define the pairs, the order of the players, the games chosen. They also started to solve small disagreements on their own, without any intervention from the instructor. There was even an episode when one student said to another that the activities were not supposed to be so competitive, in order to calm things down and maintain cordiality among all.

Collaboration between genders could also be observed, such as the formation of mixed doubles at the request of the students themselves, even though boys and girls do not often like to work together in PE classes (Bailey, 2011).

- Students H, I, J and K organized themselves to make mixed pairs (a boy and a girl) to play some of the games, because they said that in the regular Physical Education classes the doubles were always between two boys or two girls.

Some of the students showed progress especially regarding shyness and introversion, as the groups were smaller (maximum of four students per class). We realized that they felt more integrated than in larger groups such as the ones in which they used to participate in their regular Physical Education classes. In this respect, some interesting situations were observed:

- In a particular situation, student L initially asked not participate in the activity because he was not feeling well. Even so, he said he wanted to observe his classmates. However, over the course of the games, the student got excited and decided to participate, which he later did;
- In some particular moments, student M stressed to other classmates that the game wasn't a real competition and that they were there to entertain themselves and learn new things;
- Student N was playing body games with a classmate, while waiting for another couple of students to finish playing the game. They were much more uninhibited than in the previous meetings, feeling more confident and integrated in the group.

In the recorded interviews with the PE teachers, some of their comments showed how the project helped students in their collaborative and social practices. One of the PE teachers said:

Regarding social interaction, it is certain that in PE classes the students start to interact more, but they are doing it anyway [at this age]. In a game you are always exposing yourself, exposing your body. We started to observe a more extroverted attitude [from the students partici-

pating in the project], being not so reluctant to expose themselves. [... People] communicate [through] their bodies. At the moment I pass the ball to someone without any fear to make a mistake, or I ask for a ball just by looking at the other, I am communicating.

The same instructor remarked, however, that shyness is a difficult aspect to deal with. He stressed that he would not have enough evidence to make a firm statement about more permanent changes regarding students' introversion, as during the three months of the project, he only taught them one class a week (in the other class the students were in the exergame lab). Even so, it is still important to highlight a comment of one the exergame lab instructors during his interview:

It was evident that introverted students became more jaunty and disinhibited as the project advanced, at some point starting to give others tips about the games. Students who were not very active in PE classes showed themselves very motivated in the lab, also showing more interest for themes related to sports and health.

Considering the aspects highlighted above, it is possible to conclude that the exergame activities fostered social interaction between students, providing a good environment for kids to work with their social skills.

CONCLUSION

The main contribution of this project has been to show how an exergame lab can be a support tool in PE, providing an alternative to students that are unmotivated in regular PE classes. We've shown that weekly exergame practices at the lab complemented the PE classes, as students alternated between the two. These practices engaged the students in physical activity and also got them to work with their social skills.

Regarding the regular practice of physical activities, results have shown that exergam-

ing provides situations in which students can increase the regularity of their practices, engaging them in class activities. These are relevant findings, aligned with results from other works showing that through the systematic involvement of people in sports-recreational activities of a suitable nature, extent and intensity, significant effects may be reached in terms of health (Mavrić, Kahrović, Murić, & Radenković, 2014). Other studies have also shown that the introduction of exergames in physical education lessons could influence students' attitudes, subjective norm, intention and strenuous exercise behavior (Lwin & Malik, 2012).

Results also allowed us to conclude that collaboration happened at the exergame lab in many different ways, with students supporting each other throughout their practices and becoming more confident with their performance in the group. Having become involved in the project, moved by its novelty for body interaction and practice of physical activity, students also showed interest in learning more about different sports, healthy lifestyle and active living.

For future work, we are now starting to investigate how exergames may help students monitor and better understand their own physical condition through a close accompaniment of their performance in the games.

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