THE FEASIBILITY AND POSSIBLE BENEFITS OF INDOOR EXERGAMES IN PRIMARY SCHOOL

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ABSTRACT:

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The purpose of this study is to identify the potential contribution of exergames to Primary schoolers, to define what exergames are and to classify them, as well as whether exergames could be an effective tool in physical education lessons from the point of view of students. Can exergames work as a spark to turn on the engine of physical activity practice? Will students acquire or even develop any motor skills by playing exergames that can be transferred into classical physical activities?

The study was conducted with eight students of 6th grade in a Primary school in Finland. Students were selected randomly without asking prerequisites or gaming background. During spring season the group participated in seven sessions playing exergames with an Xbox Kinetic console. After the trial sessions, participants were interviewed deeply about their experiences during the trial sessions. Interviews were recorded and transcribed. Answers of the interviews were analyzed following the Phenomenology method of qualitative analysis.

The study shows that exergames attracted students through intrinsic motivation to engage an enthusiast and regular participation. Learning games in a physical and psychological safe environment was a determining factor. Besides, discovering new games from the same start point, regarding skills, favored a more homogeneous learning process within the group. The researcher noted as well that balance, rhythm kinesthetic memory and reflexes were other valuable skills developed during the trial sessions.

Keywords: exergames, physical education, primary school.

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1. INTRODUCTION

I remember playing Tetris with my little sister's Game Boy or at my friend's house playing Nintendo's Mario Bros at the beginning of the 90's. I have never spent more than half an hour straight playing computer games. I got bored and eager to play something more active and real. I don't really know why I was never attracted by video games like most of my friends. From that time until nowadays, video games have become much more popular and accessible to every kid and family. In the old times, and I mean late 1980's and early 1990's when those born in the 1970's were suffering our adolescence, we could see that many of the kids were either beginning to take advantage of new technologies in computer games and consoles or did not feel attracted to these games and cling to more traditional games and sports. The video and computer game business was clearly aimed at a certain age range: teenagers, mostly boys.

So, fifteen years later, the solution appears in the video game and computer's market to attract potential customers like myself, reluctant to play in front of the TV: virtual reality games.

Virtual games have grown spectacularly at the same pace of technology and internet use. Within the virtual games a type of game that moves and / or simulate body movements on the screen have been developed. These games are listed as exergames or exertion games.

It is obvious that today exergames and virtual games have become popular in both age ranges that before were thought unsuitable for playing video games. That is to say, sectors of society which were not typically attracted to this type of games, such as girls and women or families.

The idea of using exergames generally in school is not new, as there have been several attempts to use new technologies, and specifically in P.E lessons (Physical Education) as well.

The conception of this research was born from the mixture of several ideas and experiences, since I live in Finland. First, the amount of indoor gym hours that P.E teachers have to develop due to hard climate conditions during the winter. Second, it seems that several studies suggest that the fitness of young Finns is coming down to levels which concern health services. This will reflect in future very high costs in maintaining the health of the Finnish population. And third, the rumors of lack of motivation to participate in P.E. lessons or get involved in sports activities.

When talking with other teachers, parents and some youngsters, they all agree that a high percentage of teenagers are not interested any more in classical sports activities. Computer games and consoles have overcome physical exercise.

As a result of these statements comes my proposition: would exergames be a useful tool in Physical Education lessons or, further still, in Finnish schools?

2. DEFINITION OF EXERGAMES

The *Exergame* word was born by the combination of two words: exercise and/or exertion and games, to define a type of video game played either in front of the television or at the computer which needs physical movement. In a simple way to describe exergames, they have a common feature: they require the involvement of the player through physical movement (Yang & Yoonsin. 2010). According with The Collins dictionary (2012), exercise as a noun means "physical exertion, explanation for development, training or keeping fit". And for the word "gaming" we can choose two definitions: "an amusement or past time, diversion" and "a contest with rules, the result being determined by skill, strength or chance". Other authors used terms like: exertainment, dance simulation video game, interactive video game and activity promoting video, active video game, physical gaming, and kinesthetic video game.

In the research made by Yang & Yoonsin: "Defining exergames & exergaming" (2010), they found inconsistencies and unclear meanings when talking and defining exergames. The authors reviewed current literature and discovered that there are two differentiated groups of researchers who define exergames in a different way depending if they have a health-related research background or not.

There are some researchers related to health sciences and physical activity like physiology, nutrition or medical science who recognize that playing video games is not always a sedentary activity but may involve some physical activity. And they have agreed to classify exergames as the type of video games / multimedia interactions that require physical movement of the player to play the game.

It seems that the health-related authors are the ones who hesitate to use or define the term *exergame* compared with non health related researchers always using the same term *exergame* (Yang & Yoonsin. 2010). This inconsistency of the experts brings the question of why do health-related researchers disagree about using the term "exergames"? All the health-related researcher's definition have in common the words "activity" or "active" to define exergames. For example Lanningham-Foster (2006), who defines activity promoting video games as video games "that have the potential to promote physical activity during screen time". Moreover, Maddison et al. (2007) added that active video games "might provide a novel opportunity to turn a traditionally sedentary behavior into a physically active one". *Interactive video game* is another term found and used in four studies: DiRico et al., 2009; Epstein, Beecher,Graf, &

Roemmich, 2007; Warburton et al., 2007. Epstein et al. (2007) is the only one who defined this term, saying that *interactive video games* "use physical activity as the game playing controller, combining exercise and video game entertainment".

Exergame is the most commonly used term by researchers who do not have a health-related background. Bogost (2007) asserted that "exergaming is the combination of exercise and video games". And Lawrence, S. (2005) affirm in her article: "Exercise, lose weight with exergaming" that "new active video games combine body movement with gaming skill". It might occur that researchers and often common people are mixing the meanings of exercise and physical activity, when actually they have very different meanings.

In health and Sport Sciences, Physical activity is defined as "any bodily movement produced by skeletal muscles that result in energy expenditure" (Caspersen et al., 1985, p. 126). More precisely, exercise is: the planned physical activity, structured and repetitive; that is to say, the physical activity with a clear goal and structure. Because physical activity could mean a wide range of movements from doing the dishes, or driving a car to drawing pictures, and it is not clear that all the *exergames* involve exercising taken with its real meaning (planned activity with a defined goal), *exergames* should be the combination of physical activity and video games. Using the word *exercise* brings the issue that exercising relies heavily on the players' intentions and behaviors, and that is the reason why it is difficult to call a video game an exergame.

Another problem with the word *exercise* is that it might include sedentary activity as well. Physical activity includes two differentiated groups: one is the group including fitness components related with health such as cardio respiratory endurance, muscular endurance, strength, etc. and the other one, skills related with physical fitness components like agility, balance or coordination.

Coordination and speed reaction are decisive skills when playing video games so, one could say that when someone is playing any video shooting game sitting in the sofa is indeed exergaming.

In conclusion, the authors assert that perhaps health-related researchers are aware of the misuse of the word exercise and therefore intentionally avoid it.

Notwithstanding, later Yoonsin & Yang (2011) proposed a new definition of exergaming: "an experimental activity in which playing exergames or any video games that require physical

exertion or movements that are more than sedentary activities and also include strength, balance and flexibility activities".

3. HISTORY OF EXERGAMES

Since the invention of the first video game, keyboards, joysticks, the “mouse” and the glass of the screen, they all have become rather obstacles imposed between the player and the fascinating world where the game develops itself. Thus, from that moment, while games were simultaneously created and developed, mankind has also sought ways to have a more real and sensitive contact to video games (Oxford, 2010). Therefore, I could infer from this explanation that what players are seeking and dreaming of is to experience the virtual world where the game is developed. This is the connecting link I found between exergames and virtual reality.

In this way, exergames have certain elements of communication between the player and the computer that were developed in the area of virtual reality. Thus, we will take a brief look at the history of virtual reality and seek for similarities between them in the evolution of exergames.

There is no "official" definition of what virtual reality (VR) is. As a result, the term has been applied to any technological development that goes from computer games to three-dimensional movies; so, many people do not know what virtual reality truly is. A good definition found according to Roddel (1996) is: "Virtual Reality is a simulation of a computer-generated three-dimensional environment in which the user is able to both see and manipulate the contents of that environment." Another definition is: “a VR system is one which provides real-time viewer-centered head tracking perspective with a large angle of view, interactive control, and binocular display. “ (Neira Cruz, Sandin & Defanti 1993).

Even though 20 years ago exergames were not projected in three-dimensional images like nowadays, we found several features in common between exergames and virtual reality. First of all, all exergames are a simulation of a real environment: from tennis or football courts to skiing slopes or a dancing disco hall. Secondly, the player interacts with the simulated environment through certain input devices and finally is able to manipulate it.

In the late 1950’s a young electrical engineer named Douglas Engelbart, was the first to use and connect the first computers to a screen, being these computers machines that processed only rudimentary digits. In the early 1960's the fear of an imminent nuclear war made the United States of America to develop radar capable of processing massive amounts of data. At that time the first instant data simulator was born.

Aircraft designers began experimenting with computers to display graphics or models and airflow data. Computer engineers began restructuring and designing programs so they would be able to display theses models and compute them. The first flight simulators were born.

In order to reduce the barriers to human interactions with the computer, engineers began replacing keyboards with interactive devices that relied on images and hand gestures to manipulate data. In 1962 Ivan Sutherland developed a light pen with its images could be sketched on a computer. Sutherland's first computer-aided design program, called Sketchpad, opened the way for designers to use computers to create blueprints of automobiles, cities, and industrial products. By the end of the decade, the designs were operating in real time. By 1970, Sutherland also produced a primitive head-mounted display and Engelbart unveiled his crude pointing device for moving text around on a computer screen: the first "mouse."

Many technological devices used today by any consumer are creations and inventions funded with money from the Army that initially had a military objective and then released for use worldwide. The powerful and booming video game industry was a potential consumer of the graphics technology and would not be less. In 1976, many of the special effects of the successful movie “Star Wars” were designed by computer.

Nowadays we can affirm that all common players can differentiate an exergame from a “normal” video game depending if it requires physical gross movements or not. But more than 20 years ago, playing many rounds of any arcade game from *Pac Man* to *Pole position*, meant standing more than half an hour in the cabinet and putting some fatiguating body moves into the game. Video gaming was conducted in a fully upright position until later when home consoles and computer games arrived to be played sitting on the sofa. Playing a full session of arcade video games was not the same as jogging in the park for the same amount of time, but we can’t deny that such gaming activity with joysticks or buttons had an intimate relationship between physical movement and game-playing itself. (Bogost 2005)

Because the number of exergames developed and marketed is colossally big, I will try to sort them by focusing on the technological development of these games through their consoles and motion controllers along history.

By the late 1980`s the game industry was recovering from the crash of 1983 and Nintendo pumped up the industry with its popular Nintendo Entertainment System (NES). It was this environment that showed special interest in alternatives to sedentary consumption games.

In 1982, Amiga Inc. launches the Joyboard. Instead of using a joystick/pad, a device that the user would simply hold in their hand and push sideways, forward and backward; the joyboard required the user to stand on top of the unit. Like the many water skiing games currently available in the arcades, the Joyboard is controlled by balancing the movement of the body for directional control. The controller came with a slalom skiing game designed specifically for it, Mogul maniac (Amiga)

In 1987, Exus released the *Foot Craz,* a control pad for Atari 2600.

In 1988 Nintendo released a new pad control, called Power Pad, larger and more sophisticated than the Foot craz. Power pad was double sided: on side with a grid of twelve sensitive circles and the other side eight sensitive circles in a star configuration. Nintendo and other game developers released various games for Power Pad in the late 1980's and early 1990's.

Apparently over the months, when Power Pad was becoming popular , at the same time it was incapable of differentiating between a player's hands and feet, which led to Power Pad sessions quickly degenerating into fat children slapping the mat with their hands and making their track and field guy run so fast making them ignite.

In 1989, Nintendo releases its Power glove, a glove that has traditional NES controller buttons on the forearm as well as a program button and buttons labeled 0-9. A person presses the program button and a numbered button to input commands, such as changing the firing rate of the A and B buttons. Along with the controller, the player can perform various hand motions to control a character on-screen.

Only two games were released with specific features to use with the Power Glove: Super Glove Ball, a "3D" puzzle maze game, and Bad Street Brawler. Both games were playable with the standard NES controller, but included moves that can only be used with the glove.

The same year Power glove was released and, another motion controller is launched to the market: the U-Force, made by Brøderbund for the Nintendo Entertainment System. It employed a pair of perpendicular infra-red sensor panels to translate the user's hand's motion into the game character's movements. U-Force, looked like the fold-open plastic board for Battleship and was, according to its advertising, "So hot, no one could touch it." Players waved their hands

through a “power field” that was supposed to sense their movements and use them to make Mega Man go.

In 1993 Sega develops one special peripheral controller for its Mega Drive console: “The activator”. Activator was a sort of removable octagon that should be placed on the ground. Once the structure was built, the player had to be at the centre and disrupting infra-red laser projected from the corners of the octagon onto the ceiling.

By interrupting the lasers, the system detected that a button was pressed. Given that each corner of the geometry was assigned to a button in a more or less logical way, a priori the system might seem fun. But the light beams were easily distorted by a non-flat ceiling or obstructions such as blades of a ceiling fan or light fixture. So The Sega Activator was dismissed by consumers due to inaccuracy.

In Japan, during 1998, a new arcade game appeared that would open the doors to the creation of exergames’ terminology: Dance Dance Revolution (DDR abbreviated).This new game was developed by Konami and was available in 1999 in the arcade halls of United States and Europe. Although the motion controller was not new, as it was similar to the Power Pad (Nintendo) but backlighted, DDR was the pioneer of rhythm and dancing games. Players are placed on a dance platform floor and hit the arrows that light up on the platform according to the rhythm of the music and the "dancer" giving instructions on the screen. DDR has received since its creation many positive reviews for its originality, and ability to develop coordination and stamina of practitioner players.

Following the music fever created by Dance Dance Revolution, in 1999 the game “Samba de amigo” was developed to use in the Sega Dreamcast. Samba de Amigo is a rhythm game originally developed by Sonic Team and released first for arcades and later in the year 2000 for the Dreamcast video game console. The player uses controllers shaped like maracas with the goal of matching a series of patterns displayed on-screen. It can be played by one or two players simultaneously. Magnetic sensors were used to determine the maracas position in the arcade version, so Sega had to come up with a cheaper system. In the Dreamcast version (the successor of the Saturn version), each maraca has a cord which is plugged into to a bar that lies in front of the player's feet. The bar is slightly over 50cm in length and has a sensor at each end, and each maraca has an ultrasonic transmitter mounted on its cord; this allows the system to triangulate the position of each maraca.

At the entrance to the 21st century with the unstoppable exponential development of chip processors for consoles, we enter into the era of motion sensors to control games.

In 2003, the long time planned EyeToy for Playstation 2, Sony, was launched into the worldwide markets. The EyeToy is a digital camera device, similar to a webcam, for the PlayStation 2. The technology uses computer vision and gesture and motion recognition to process images in real time taken by the camera.

This allows players to interact with games using motion, color detection and also sound as it is built with a microphone.

In 2006 Nintendo launches the console "Wii" to compete with existing Playstation and Xbox 360.The most distinctive feature of the console is its wireless controller, the Wii Remote, which can be used as a hand-held device with which you can point out, as well as being able to detect motion in a three-dimensional plane. With the Nintendo Wii the first game developed for this console is included: Wii Sports. The game is a collection of five games designed to demonstrate the ability of the peripheral “Wii remote" to motion detection. These sports are tennis, baseball, bowling, golf and boxing.

The final motion controller or motion detector to control a video game, besides the Sony Eyetoy, to appear on the market is the Kinect for the Xbox 360 developed by Microsoft. It was introduced in November 2010. The Kinect device features an RGB camera, depth sensor, microphone and custom processor that manage the capture of the whole body motion in three dimensions.

The motion sensor detects not only the joints of the body as previous drivers, but detects the movement of the entire limb: arms, legs, waist, hip, and head. At the moment of playing, Kinect takes a digital pattern of the body based on data depth. Like Wii and Playstation, countless games have been developed to be used with the Kinect device in the Xbox 360 such as Kinect Sports or Kinect Adventures.

Since the explosion of exergames all kinds of machines and devices have been adapted to be connected to a console in order to practice some kind of physical activity in front of the screen. The most obvious case is the amount of local gyms that either choose to install a console with its controller in a room for their customers to use or invest in buying the "latest technology" in fitness equipment. That is to say, the classic working out machines such as stationary bikes, treadmills and rowing machines which have adapted a screen for the user to pretend the feeling

of working out in a different environment other than the gym. I'll talk about these devices in the next issue: Classification of exergames.

4. TYPES AND CLASSIFICATION OF EXERGAMES

In reviewing the vast amount of exergames market, we could classify them in multiple ways: by year of sale, quantity sold or popularity, manufacturer, etc... The most interesting way of classification I have seen so far from the point of view of a professional in the area of physical activity, not of physical education, although both are closely linked, is used by Ian Bogost in his article: "The rhetoric of exergaming " (2005).

Bogost mixes terms as agility, ability of reacting, the activity of running, training and motivation to play to make a brief review of the history of exergames while simultaneously classifies video games and consoles according to the terms mentioned previously. Yet, as the reader may notice, Bogost jumbles factors involved in *exergames* such as basic skills with activities and motivation.

In order to simplify the categorization, I will do it from the point of view of the analysis of the function attributed to each device, that is to say: what is the device made for.

4.1. Game controllers

Nintendo Wii

Since the release of the Nintendo Wii console, controllers have evolved at the same time than videogames to keep exergames' consumption fever rather high. The Wii controller list is as follows:

Wiimote: Is the original Wii remote. Its main features are the ability to detect acceleration in three spatial axes thanks to an accelerometer ADXL 330 and it is able to point to objects on the screen featuring a Pix Art optical sensor.

Nunchuck: It is an analog joystick with two buttons (known as nunchuk), connected via a cable to the Wii remote and commonly used to control the movement of the characters.

Wii Zapper: Basically it is a platform-like gun to install the Nunchuk. It is the accessory used in some shooting games and the archery game Link's Crossbow Training.

Wii Wheel: same principle as the accessory above described; the Wii Wheel is just an adapter for the Wii Remote which is installed horizontally in the center of a wheel. It doesn't add additional features and serves mainly to give more sense of reality in racing games. This device can be bought separately or included with the game Mario Kart's Wii, F1 2009 and Excitebots: Trick racing.

Guitar: Another platform that was developed for simulated musical instrument games the kind of *Guitar Hero*. Shaped like an electric guitar in which the Wii Remote will be attached horizontally, has also additional buttons on the guitar's neck, a tab or trigger in the area of virtual strings and a lever to play with distortions.

Balance Board: This accessory consists of a platform able to calculate the pressure exerted on it by means of four sensors. It was sold alongside the Wii Fit. Currently there are over 15 games developed to play with this controller. Almost all games develop elements of balance, rhythm, coordination and dance.

MotionPlus: It is the evolved version of the Wii remote, as it incorporates three different motion sensors, one for each spatial axis, unlike the Wii remote that incorporates only one. Some games require the obligatory use of this more sensitive controller.

Vitality Sensor: The Vitality Sensor is a controller originally announced in 2009 and has not yet reached the market. This driver is able to read our bloodstream with the aid of light sensors that determine and measure a person's bloodstream. This would provide data to the Wii about our body's reaction to certain stimuli of some games or just how we feel in that moment. The level of stress or relax are some of the factors that the Wii Vitality Sensor will be able to measure. According to these levels Wii will suggest the best games to play.

Remote Plus: Combines Motion Plus and Wii Remote controller into a single Wii remote size.

UDraw Game Tablet: Touchscreen tablet used to play in games such as Udraw, Dood's Big Adventure and Pictionary for Wii.

Sony Playstation.

Sony has developed two motion controllers: the first, Eyetoy, of which we have spoken in the history of exergames. The second, Playstation Move, was launched in 2009 to counteract the success of the Nintendo Wii. It is similar to the Wii Remote controller with accelerometers prepared to detect motion but also includes a ball on one end of the command that glows in a

different color from the room where the players are, in order that the other controller that works together: the Sony Eyetoy, detects its position in space.

Ex-r-station. Powergrid fitness.

This driver is a platform with a non-articulated arm where the controller is situated and sends the commands to the console. This control has a handle with grips that the player pushes, pulls or moves in the desired direction like an enormous joystick. The control system has sensors that detect motion with which force to push or pull the joystick. It has a scale, to select the hardness or more accurately the force to be applied in order to move the character or the vehicle of the game. The exertion platform supports are Playstation, Xbox, Gamecube and PC.

Kinect. Developed by Microsoft for the console Xbox 360.

Kinect is considered a great technological device because of its ability to control the games without having to hold any command as their opponents Nintendo Wii or Playstation Move. Some experts criticized about the need of too much space to play or to the difficulty to learn the movements required by the games. (Gameinformer.com, 2010)

Gamercize

Gamercize.net is a company dedicated exclusively to the development and commercialization of different *exerdrivers* to use with the current market consoles. The range of product goes from spinning-like bikes and rowing machines to steppers. All models have an adult's version and one adapted for children as well. These drivers move the character or vehicle to the speed at which the player pedals or rows. Apart from that, the player will have to deal with their hands with the original remote control of the console in order to make the game's character jump o grab things.

Gamercize.net offers products designed to be used either at home, school or gym. They also have an additional service of Training assistance through internet.

4.2. Exerconsoles

I have made use of liberty by calling *exerconsoles* to consoles created with the aim of reproducing only exergames. These are:

Dance Dance Revolution. Konami digital entertainment.

Dance Dance Revolution is an arcade machine wich consists of a platform with four impact-sensitive pads, backlited and indicated by arrows in four opposite directions. The player tries to step on the arrows at the pace and directions of the music and scheme pictures shown on a monitor in front. The player gets better punctuation according to the accuracy of the steps on the arrows performed in the right place and at the right moment. Nowadays, Konami has released its DDR game for home console's market with the platform Wii of Nintendo.

i Dance and i Step. Positive Gaming

i Dance y *i Step* are two products developed by Positive Gaming company, taking as inspiration for the design of their products the successful arcade game Dance Dance Revolution from Konami. Their products are exergames catalogued as "machine dance games" (www.positivegaming.com, 2012). Positive Gaming offers a complete set-ready product that runs on its own processor connectable to a monitor or projector and dance platforms suitable for heavy duty use in schools and gyms. The game can be danced by up to 32 players simultaneously, connected wirelessly and with three different difficulty levels played at the same time

XaviX Sport.

XaviX is a processor developed by SSD Company Limited. The system's core is XaviX Port, the multiprocessor chip that is plugged into the TV monitor. Unlike other consoles, the motion detection system is integrated in each game cartridge and it is sold separately. This means that you buy one game at a time. Each game includes the corresponding controls: tennis rackets, a bat and ball for baseball, a platform for fitness games, etc. XaviX's product's range goes from tennis, baseball, bowling to fitness and music games. One feature of the music and fitness game that has caught my attention is the possibility to connect your own CD or MP3 player to the XaviX Port in order to process your songs and create a "machine dance" game.

Trazer

Trazer "interactive fitness machine" belongs to TRAQ Ltd Company. The Trazer device has three different applications: high performance training for athletes, fitness in gyms and rehabilitation. Trazer's system console comprises a processor that detects an infrared emitter when the player is wearing in a belt. The system detects the position of the player in space and transmits it to the screen in front of the player. To add hardness and difficulty to the games, the same belt where you place the infrared transmitter works as a harness where you can hook rubber bands anchored to the ground. These rubber bands limit the motion of the player making it even more difficult to move.

4.3. Simulators

Before entering in the classification and analysis of the simulators on the market, I would like to point out that simulators are not designed to display a game; this is why I would not classify them as exergames. Simulators are machines where the user exercises while viewing images, either about information on the activity being performed or a simulated trip in a virtual place. These images make the user keep his motivation at a high level in order to achieve different objectives.

All the simulator devices have several features in common: physical activity is simulated on a machine at a specific location without having to move in space, usually indoors. Simulators transfer the user's activity to a virtual tour while offering different information on the activity.

Virtual Runner. Outside interactive.

Virtual Runner is a software program designed to work with the existing treadmill the runners already own. By installing Virtual Runner on the PC or Laptop along with selected videos and then attaching the included foot pod to your shoelace and plug in the USB stick to the PC or Laptop, the software begins to play on the monitor. As you run, the foot pod transmits your pace to the USB receiver. This data is processed by the Virtual Runner Software, which adjusts the speed of the video based on this data. If you run faster, the video will speed up. If you slow down, the video will also slow down. The runner also has the option of starting anywhere along

a given route by selecting a mile marker so a course can be broken up and covered over several runs.

Virtual Active™. Matrix

Virtual Active ™ (Matrix) offers this interactive software for their range of cardio machines 7XE: treadmills, steppers and bikes. This system is installed on certain models that support this software and also have a monitor where images of the runner's, cyclist's or hiker's route are projected and performed on the machine. Video speed elapses at the same speed as the athlete. The duration of the courses varies from 30 to 90 minutes.

Bicycle Trainers

The bicycle trainer's market has grown significantly in recent years, since the use of new technologies for training: as computers, smart phones, power meters, GPS, etc. The top brands compete to offer the most advanced products, combining the use of computer and internet with the cycle trainer. The most representative brands of cycle trainers in the market, Elite, Tacx, Cycle Ops, Bkool, have in their high-end range, products that connect the computer to the cycle trainer while projecting images of a virtual tour elected and giving information about physical activity. The most advanced models are connected in real time over the Internet to other users with a similar system so they can compete on the same track even though each rider is cycling at home.

As for the Garmin Edge 800, it is not a real simulator; it is a cycle computer with many features due to the incorporation of GPS (Global Positioning System) technologies, ANT + (Garmin), and subsequent reading of the activity on the PC. One feature that is not an Exergame but we could include it as simulator, is the ability to download tracks to your device that other cyclists have done previously. Once on the bike, the system tells you the path to follow as a common GPS, but also shows the cyclist who originally created the route with an arrow icon and the speed at which he performed. So the rider who takes the road again can compete virtually with the rider who made the route. This function is called Virtual Partner.

Smartphone's applications

Today's mobile phones have become small PC with the emergence of applications (Apps). With the evolution of games and processors, we practically have the resolution of a console in our hands. Unlike desktop PCs and home consoles, mobile phones follow their users anywhere and are always available, allowing the creation of exergames that promote outdoor physical activities like running or walking. Also, the rise of social networks has made us to be constantly sharing information about our daily activities. This has allowed the sports Apps normally used to record a sport activity, to share the activities later on a social network for different purposes. Most smart phones include GPS (Global Positioning System) indicating position in space, accelerometers that detect acceleration and gyroscopes that detect the position of the mobile into different spatial axes. With these tools and our smart phone in hand, we have a controller similar to the Nintendo Wii with the difference that calculates our position thanks to GPS.

Having explained all this, let's now take a brief look at the most interesting fitness, sports and exergames Apps I found that may serve us from the point of view of physical education.

Zombies, run! (Six to start) is a game in which the player is immersed in a world overrun by zombies. With the headphones connected to your Smartphone, you receive information to complete missions while walking and collecting virtual supplies or running if the zombies chase you. The player runs for real down the streets and through the GPS system, the Smartphone sets missions and randomly places obstacles. Once the mission is finished, with an average duration of approximately 30 minutes, you can share your activity with other players in a social network.

Similarly, *World of Workout* is a game based on a pedometer where quests have to be completed. Completed missions open new areas of the virtual world you interact in. You carry the Smartphone in your pocket acting as a pedometer counting the steps. A vibration alert lets you know when you get to a place to perform a quest.

Hidden Park is a game aimed for children. Kids have to find magical creatures hidden in various locations in the real world by walking and solving puzzles. It has a nice feature where kids have to take pictures of themselves in the indicated locations and “magically” the creatures will appear beside them in the picture.

Another category of mobile exergames, of which most of them have the surname of “tracker” employs supplementary sensors to exploit additional user data, such as external accelerometers and heart rate (HR) sensors. *Nike+* for the iPhone, although not strictly a game, records the

number of user's steps through a sensor inside Nike shoes, allowing the user to compare his/her activity with other users' and friends' data.

Kazakos et al. (2008) proposed a Smartphone exergame which employs an accelerometer attached to the user's waist to measure physical activity during the day. In *NEAT-o-Race*, when the user moves in the physical world, her avatar moves on a virtual racetrack, accumulating "activity points" and competing for them with friends.

Runtastic Pro (Runtastic) and Endomondo Sports Tracker (Endomondo) are sports tracker applications that use the individual own Smartphone GPS and accelerometers to track and record the user's activity. Once recorded, the user can share activities in a social network.

Instant Heart Rate Pro (Azumio Inc) is an application to detect the user's heart rate just by placing the finger on the flash light of the Smartphone. The App will record the data so the user can monitor his/her fitness level.

Loco Snake is an application developed by Chittaro & Sioni (2012), based in the classical mobile game of "Snake". The player walks with the Smartphone in his hands inside a predetermined area set by a GPS map and acts as the game's snake eating all the fruits shown in the screen.

And finally, as a wink of humor, *Anti Mosquito Sonic Repeller* (Pico Brothers), offers a repeller that works with an ultrasound signal emitted by our Smartphone to fight the "mosquito army" that rules Finland's forests in the summer.

5. TIME SPENT BY YOUNG FINNS IN PHYSICAL ACTIVITIES, REGULATED PHYSICAL EDUCATION AND PLAYING COMPUTER GAMES

It is "public knowledge" and frequently news in both newspapers and newscasts, the concern about the low level of physical activity of our young people. Let's find some facts about it and how they relate with the time spent playing video games.

In the research done by Palomäki & Heikinaro-Johansson (2011a, 55), results confirmed that 48% of basic school aged boys participated in organized physical activities after school and 46% practiced on their own. That means that almost one out of two is assisting regularly to some kind of instructed physical activity and the other one is practiced sporadically. What

comes to girls results were close: 38% takes part in organized physical activities after school and 42% practice on their own. In any case, this research does not indicate the time that kids spend practicing physical activities.

According to Tilastokeskuksen ajankäyttötutkimus (2010), basic school aged kids spent 73 minutes of physical activities on a school day and 71 minutes on a free day, and high schoolers 70 minutes on a school day and 65 minutes on a free day.

In the research done by NUORI SUOMI in 2010, in children from 7 to 12 years old, 36% takes part in organized activities after school three or more times per week. We could therefore assume that this means an average of one hour per session. 37 % takes part twice a week in organized activities and 36% once a week.

What comes to physical education hours at school, the actual Education Program dictates that basic school aged children should have two school hours of physical education per week, and this means a double lesson of an hour and a half or two separate lessons of 45 minutes. The incoming Education program of 2016, states that students should receive three hours per week.

In the last few years we have noticed a new group of youngsters who admits being totally physically inactive. According to the same research of Palomäki & Heikinaro-Johansson (2011a, 55), 7% of girls and 10% of boys in Finland, in the year 2010 did not practice any kind of physical activity at all.

Also, in a research done by LAPS SUOMEN in 2000, it seems that half of the time of wakefulness in children 9 to 12 years old, i.e. about 7 hours, it is completely physically inactive. Laakso et al. (2006) sayed in their 2006 study, that passivity of young Finns has increased significantly in the last 20 years.

These last facts bring us to a closer look at the time spent by these youngsters playing video games, an activity clearly considered as a “non physically active”. According to the research done by Miettinen and Rotkirch in 2012, time spent in the computer has doubled in basic school aged children and tripled in middle school aged kids, in the last ten years. Basic school kids spend about one hour a day in the computer, but boys in fact spend two hours in a non scholar day. In middle school, time spent in a free day from school in front of the computer was close to three hours for boys. The same research also tells us about the time spent in front of a screen, also called “screen time” wich includes computer, video games and television time. Basic school aged boys spend three hours of screen time and two and a half for girls. In their free time

boys had almost four hours and girls three and a half. It is worth to mention that this research was done when the use of smart phones were exploding among adults and youngsters, but nowadays, basic and middle school kids also have their own smart phones. This means also screen time. (Miettinen and Rotkirch 2012.)

Despite I was not able to find recent facts about time spent using smartphones by young Finns, I came through some significant data from other countries. In a research conducted in South Korea about early childhood and smartphone addiction, they found that, 10.7% of teenagers have developed internet addiction, and 7.3% of young children from 5 to 9 years old (Cheol Park and Ye Rang Park, 2014). Another survey in Britain showed that kids are spending 17 hours per week in front of any given screen.

If we take in consideration all these figures about the way kids and youngsters spend their free time, it shows clearly that school aged children are spending a lot more time in a passive way and static position, than spending time physically active.

Thus, it is clearly shown that, what we call "screen time" is stealing time from taking part in physical activities among other negative effects. But, bearing in mind that technology is an essential part of our everyday life, it is difficult to change the habits of millions of kids. Let's face the problem from another perspective: "If you cannot defeat your enemy, join him". Shall we then consider the potential benefits of exergames?

6. POTENTIAL BENEFITS OF EXERGAMES.

The reason that triggered investigation into exergames since the first game that popularized this type of video games was launched, DDR (Konami), was the expenditure of energy that could mean regular use of these games. For this reason there is an increasing concern about children and adults who are insufficiently active to benefit their health and, with motorized transport safety concerns, fewer manual jobs and sedentary leisure activities exposed as contributing factors. (Varo et al. 2003). Therefore, the appearance of these games suggested another tool to solve the complex problem of overweight Western population.

What comes to energy expenditure (EE) and heart rate (HR) while playing exergames, all consulted authors came to the same conclusion: the amount of energy exerted playing

exergames is significantly higher than in the moment playing conventional videogames and less than a traditional game that requires physical activity. Let's see briefly the different cases.

Lanningham-Foster et al (2009), found that two different age groups, adults and children, consumed fairly more energy playing Nintendo Wii Boxing than playing sedentary video games and raise the energy expenditure almost to the same level than playing traditional games and activities. If adults would play only four hours a week with the Wii boxing game, they would burn an average of 124 calories per day, a similar figure to the activity of walking on a treadmill for the same period of time at a speed of 2 mph. (unpublished observation).

Graves et al. (2010) compared the physiological cost of Wii Fit (yoga, muscle conditioning, balance and aerobics) and brisk treadmill walking and jogging in three different age groups: 14 adolescents, 15 young adults and 13 older adults. For all three groups EE and HR was greater than sedentary video games and Wii fit elicited moderate intensity, bearing in mind that HR fell below the recommended intensity for maintaining cardio respiratory fitness:80% HR max for young adults and 60% HRmax for adults (Baquet et al 2003; Pollock et al 1998).

Tan et al. (2002) made a research with a dance simulated game. The results showed that the cardio respiratory effort was comparable to a medium intensity aerobic dance (HR of 137 avg per minute). Though the authors remark that the average duration of the dance activity was 6 minutes when many health agencies recommend that young people engage at least 60 minutes of physical activity per day.

Maddison et al. claimed in 2007, that the EE and HR while playing exergames compared to sedentary video games and rest, increased from baseline to a range that goes from 120% to 400%. The energy consumed was similar to brisk walking, jogging and jogging. Also acknowledged that the children subject to experiment, were required to play the exergames just for 5 minutes, but if children were to play the same games used in the experiment for 30 minutes, it could have a proved effect on body weight in young people.

When involving overweight and non overweight participants, Unnithan et al. (2007) evaluated a group of 10 overweight and 12 non overweight children. Participants played with DDR in the easiest level for 12 minutes. Overweight children spent significantly more calories per minute than the non overweight group. The percentages of HRmax were around 64%. Authors pointed that participants played in the easiest level, and considered that playing in more advanced levels

where the tempo is faster and songs results in a more difficult choreography, EE would be significantly higher.

The number of studies of energy expenditure which entails playing exergames is very high. Data vary from one study to another depending on the Exergame played, the time spent in each game, weight and age of the participants. Daley (2009) suggests in her article "Can exergaming contribute to improving physical activity levels and health outcomes in children?" that potential intervention effects should be studied in further research having in mind different factors such as level of expertise, user's preferences and novelty.

In my opinion, researchers did not find any really surprising data regarding caloric expenditure, as many videogame companies possibly expected after the boom in sales of the Nintendo Wii. This led researchers to finish almost all the scientifical articles suggesting both potential psychological and motivational benefits of exergames. We will assess psychological and motivational benefits below.

The first positive note is that Exergaming provides children and not so young children, the opportunity to exercise at home when the weather does not encourage going out to play outdoors and being at home allows parents to supervise a convenient activity according to the age of their children while spending what is popularly called as "family quality time".

There is compelling evidence (Steptoe & Butler 1996) showing that participation in physical activity encourages psychosocial and emotional health of children. This is another potential benefit that exergames can offer when played in a group or at least in pairs. Obese children might find in exergames a solution gate for their problems of low self-confidence regarding exercise (Daley 2006) as home gaming offers a familiar and non-threatening environment to their self-esteem.

Graves et al (2010) measured the enjoyment of playing Nintendo Wii Fit in three different age groups. The authors highlighted enjoyment of an activity as a "key determinant influencing the allocation of one's time to that pursuit". Research was done by comparing participants' enjoyment while playing sedentary video games, Wii Yoga, Wii muscle conditioning, Wii balance, Wii aerobics, brisk walking and jogging in the treadmill. Wii aerobics was the activity most enjoyed by groups of teenagers and young adults. Likewise older adults enjoyed almost as much Wii balance as walking on the treadmill. The authors conclude from this study that enjoyment associated with exergames shown by teenagers and young adults can help inactive

individuals who do not practice any regular aerobic activity, to enroll in the assiduous practice of exergames. Following the enjoyment, a group of young adults rate having fun as the most important reason that led them to play DDR, followed by social interaction, exercising, dancing, meeting other people with similar hobbies, enjoying the challenges offered by the game, and the searching of skills' improvement. (Lieberman 2006.)

Russell & Newton (2008), tested the mood of 168 college students who regularly used a bicycle ergometer. This mood remained highly positive at least ten minutes after completing the exercise. Also this ergometer group performed better in terms of having better mood than a control group playing sedentary video games. This improved mood after played exergames may transfer to other exercise activities (Lieberman, 2006).

Finally, motivation is intrinsically linked to video games as they respond to the player's actions and offer challenges at different levels of expertise (Malone, 1981). Fourteen teenagers chose to ride and cycle ergometer and work out rather than having more sedentary activities like reading and painting in order to get access to visual entertainment: TV, DVD or video games (Saelens & Epstein, 1998). The same case was reproduced in a group of 34 obese preteens who obtained points from a pedometer linked to a physical activity to get media access. (Goldfield et al, 2000).

7. MEANING OF THE STUDY, RESEARCH MATERIAL AND METHODOLOGY

This chapter is devoted to present the objective of the study, research methodology and research questions. According to Alasuutari (1999, 82), the method consists of the practices and studies through which the researcher finds results and create the rules where findings can be modified and interpreted.

7.1. Meaning of the research and research questions

The research aims to find the answer to the following questions:

1. Could exergames work as a spark to turn on motivation for physical activity?
2. Do students acquire or even develop any motor, social and cognitive skills by playing exergames that can be transferred into classical physical activities?

The purpose of this research is to gather students' experiences during the trial period in order to understand the meaning of the use of exergames in the school under the subjective viewpoint of an observer. The viewpoint of the observer will be under the umbrella of Physical Education and Pedagogical sciences. Experiences will be taken into account to create a further hypothesis whether exergames can motivate students to practice classical physical activities. I also tried to identify the player's own feelings and skills that emerged during the trial period to place them as benefits or detriments in the feasibility of exergames in school.

7.2. Qualitative analysis and phenomenology

The main goal and last resolution of Qualitative research is to understand and interpret reality as it is understood by the participants in the context under study. Qualitative researching studies the phenomenon in its natural context, as it happens. It tries to infer or make sense of a particular event or events according to the meanings they have for the subjects involved. At the beginning of last century, sociologist Emile Durkheim already stated that "the Social scientist must

consider a social phenomenon or events as matter that exert external influences on individuals". (Durkheim 1919).

There are many methods of Qualitative research but the one I will use to research the phenomena occurred while playing exergames is called Phenomenology.

Phenomenology tries to explain the meanings of the events occurred in our daily lives. Phenomenologist attempt to understand social phenomena from the actor's point of view that is to say from the person involved in that phenomenon while experiencing its meanings. The reality that matters is the one that people perceive as relevant. The phenomenologist seeks for understanding through qualitative research methods as participants' observation, interviews and so on, which generates descriptive facts.

7.3. Research Material

The research data was gathered through three different ways. First one, a short questionnaire to the future participants in the research. Secondly, my notes and thoughts during the trial period. And finally, groupal interviews of the participants were arranged and recorded with multiple questions framed in different aspects of the research.

The time spam of the research was from October 2012 to June 2014. The first questionare was given to the selected participants in February 2013. Trial and later interviews were developed in March 2013. The background material was collected from October 2012 to May 2014 and the present writing was done between March 2014 and June 2014.

Eight subjects were selected to participate in the research. These subjects were students from 6th degree in a primary school of Finland. I wanted a small group in order to be able to focus first on their experiences individually and later also as a group. I didn't have any special requierements about gaming background experiences of the participants because I wanted a group as much heterogeneous as possible. My only condition was to have all students from the same class to avoid initial factors of shyness and promote the activity trying to replicate what would be a normal routine groupal behavior. I also wanted four girls and four boys to participate in the trial. The class teacher arranged a simple draw to select the subjects.

Before the beginning of the trial a short questionnaire was given to the participants to fill at home. Participants were asked about previous experiences playing exergames and also the amount of physical activity they practice in their free time. The second question was about the expectations they have about exergames.

The trial consisted in seven groupal sessions of one and a half hours, aproximately, of exergames with an Xbox kinetic console. We had at our disposal a class with its projector and audiovisual equipment to connect the Xbox. We had two different games that we used according my trial's design. During the sessions my rol was mainly as an "offerer" of the possible games and observer. I did help solving technological issues and also in case of disagreement or bad behavior. But it was the participants who mostly decided what to do in the sessions. I prefered to keep myself distant in order to focus on the participants experiences and not in the session leadership. Notes were taken about reaction of the participants, my own thoughts, influence of the games, etc.

I chose the participants' age considering that 6th graders are young enough to enjoy game playing with the enthusiasm that kids have but old enough to take iniatives and avoid typical childish behaving. Past researches have shown that younger children are, in general, physically more active relative to adolescents and adults (Department of Health, 2004; Joint health surveys unit, 1998). When children make the transition into the adolescent levels their physical activity decrease. (Andersen, Wold & Torsheim, 2005). I also expected a certain degree of maturiy in order to have fruitful anwers in the further interview. I will analyze the maturity issue through the analysis of the trial sessions and interviews.

And last, another reason to choose this group was the availablity given by the principal of that specific school and his invaluable support during my internship of Pedagogical studies in the same school. These two factors made easy to arrange a trial group in the same school.

7.4. Trial session's experience

Trial sessions were developed during February and March 2013. Seven sessions of slightly more than an hour. We had at our disposal the biology lab with its media equipment. Before every session, it took several minutes to arrange the console equipment and the space to play. This is an issue worth to take into account for future researches and users of exergames in

school or with big groups: installation difficulties. The Xbox console needs to be plugged obviously to a screen tv or projector wich will be allocated in front of the players. The same way the sensor must be allocated in front of the players. At first the idea was to use a projector and a big screen to let the kids move in a bigger area and have an enjoyable perception of their avatars on a big screen. The problem arose when having to connect the projector to the console and this to the sensor: the sensor cable was not long enough to be allocated far enough from the projector. Xbox is not designed to use in larger spaces than a living room and, until 2013 it was imposible to find a cable extension for the sensor. So I had to install all equipment hanging on top of the participants to make the best use of the length of the cable and avoid all possible risks. As a conclussion on this matter, if future sessions were to be developed with big groups, using a projector is rather difficult; whereas big screens are much an easier solution.

The sessions were designed as follows:

1. How to use Xbox. Teacher's presentation and getting to know the group. First game: Kinetic adventures : liferaft. Individual playing

2. Second game: Dance central: Introduction. First level. Individual playing. Kinetic adventure: partner playing.

3. Kinetic adventures: "collector" and "rally ball". Challenge in couples.

4. Dance Central. Dance battle. Individual.

5. Girls' challenge. Dance central.

6. Boys' Challenge. Dance central.

7. Free choosing.

7.5. Console games used

In the next section I will justify why I chose Xbox as the console to be used in the trial. The first and main reason is that in that moment it was the only device in the market that did not require the players to hold any kind of sensor. Unlike Playstation or Nintendo Wii wich detect the players motion through the movement of the sensors held in their hands, Xbox detect the motion of players' limbs. I found as a key reason that future scholars do not have to touch the

console device by any reason except to turn it on and off. This function should indeed be done by the teacher to assure that every aspect of the session is checked. With this advantage regarding other consoles, the teacher (and the school) will prolong considerably the lifespan of the device, knowing that school material should be "bulletproof" in order to resist the student's use.

Secondly, Xbox detects also lower limbs motion. This means that players have to adjust their whole body movements to the ones required by the game. Consequently the range of motion movements offered by the console is bigger than its competitors' and also this function demands a higher level of focus and coordination from the players. Other consoles either require other gadgets to detect motion in lower body or simply do not detect them.

Another reason was the possibility to play "on line" and play in couples. Most of the consoles nowadays offer the same features but Xbox was one of the pioneers in these concepts.

And finally, the fact that players do not have a sensor in their hands made movements more natural and close to real ones. Which means that, in the Nintendo Wii for instance, the Nun chuk sensors have several buttons which, dependig on the way and the combination, the player uses to press them so the corresponding avatar will move in a certain way or another. This is not close to real motion where the sportsman has not buttons in his hands to command his movements.

Regarding the games we played, they were *Kinect Adventures* and *Dance Central*, both from Xbox. *Kinect Adventures* is a multiactivity exergame. This means that the game itself collects inside different activities or tasks:

- *River rush*: this activity consists in balancing the avatar in a liferaft in order to gather points or jump obstacles. It can be played by two players at the same time. Both players have to agree when to move or jump in order to handle the raft.

- *Rally ball*: the avatar will shoot or kick bouncing balls in a limited area and time in order to collect points. The game can be played individually or in one vs. one mode.

- *Reflex Ridge*: the avatar stands on a moving platform that goes forward in an abandoned mine environment. The player will avoid incoming obstacles by jumping, bending down, or lifting a given part of the body, without moving from the platform. The avatar will gain points according

with his skill to avoid obstacles. The activity can be played individually or one vs. one challenge.

- *Space Pop*: The avatar is situated in a room where bubbles come out off the walls. The player gains points by collecting bubbles. The player can move in all directions in the room or even fly by flapping his arms and balancing on a given direction. This activity can be played by one or two players at the same time.

- *20.000 leaks*: similar to Space Pop but in this activity the avatar will have to stop several leaks appearing from the walls with his hands and feet. One or two players can play at the same time.

- *Dance Central* is a dance game developed with popular hits. There are six different modes of playing:

- *Step by Step*: learning mode with a "teacher" who will teach you the dance choreography step by step. The teacher will check if the player is moving the correct limp at the proper tempo.

- *Act*: the player will complete the selected choreography and gain points according to the similarity with the original dance. There's also a short part in every song called "freestyle" in which the player can execute his own movements and gain points thanks to his own choreography.

- *Challenge*: combination of different songs and its corresponding choreography. Once you collect enough points you will gain access to new songs

- *Battle*: two players compete in turns dancing the same song. The one who collects more points becomes the winner.

7.6. Interviews and questionaire

The main idea of the interview was to gather opinions and experiences from the previous trial sessions. I designed an extensive interview including five different issues related to exergames: Health, Physical activity, Psycology, Social and Cognitive aspects. Finally, there are questions as a general feedback of the whole trial period.

The amount of questions prepared was excessive at first sight. The reason for this amount was due to the likely "I don't know"and "yes – no" answers provided by the interviewees so, I thought that asking a lot of questions related to the same subject I could extract and gather some

reasonable answers to work with afterwards. Indeed, that is another factor that I notice I should have thought throughly before choosing the age of the participants. Moreover, the difference of maturity between girls and boys was more than obvious. While most of the boys did not take enough time to think about the questions during the interview and give a justified answer, the girls reflected matured answers according with the level I expected. Most of the girls were participative and justified their opinions about the questions given.

I would like to point out as well that shyness level in the interview was another influential factor. For that reason, I decided to change individual interviews in order to avoid the feeling of pressure that an interviewee may feel from the interviewer. I interviewed the boys in couples and then decided to interview the girls in small groups to save time and trying to relax the interview atmosphere. Having considered the shyness condition, I still think the boys' interviews were not as fruitful as I had expected. Specially after the first interview receiving a lot of "I don't know" answers, I felt frustrated because of the lack of information I received for further research. I did not want to put too much pressure on some of the participants so they could give a considered answer. I had the feeling that one participant was close to crying in several occasions when I asked: "Why did you anwer no"? Luckily, girls saved the situation with productive answers.

Another characteristic of the interview is that I added several introductory questions on each of the topics in the interview such as health related questions, for example, I began asking "What do you think being healthy is?" or "Can you describe what having a healthy feeling is?". With this type of questioning used as "warming up" questions I believed it helped the participants to get themselves into a positive interviewing situation.

8. RESULTS OF THE INTERVIEWS

8.1. Health related questions

Participants related the term “health” with physical activity, an adequate diet and being outdoors. For some of the respondants being outdoors, wether training, walking the dog, or just playing with friends, meant doing something healthy.This meant straight away from the very beginning that they might not consider exergames as healthy, or putted it in another way: I can deduct that they somehow know already that staying indoors at home continuosly is not healthy. This doesn’t mean that they are consequent with their believes or ideas, but at least they have a “guilty” feeling if they stay indoors all time. Participants also agreed that after physical exercise although tired, a healthy feeling comes as well.

Participants have a common belief that exergames promote health. I did not go further in this topic asking if exergames promote healthy behaviors afterwards; however, in their opinion, while playing exergames they learned to “use their body”. One of the participants pointed out that the console demands properly done movements in order to achieve the targeted choreography. Meaning that player has to extend one leg to the left, for example, a short distance as the avatar “teacher” does in the screen. If the player’s leg was not extended enough, the movement was poorly done and consequently the player will get less points. This is a feature I didn’t notice about the advantages of Xbox from other consoles: the sensor detects joints position as knees, ankles, wrists, hips, and so on. Following this feature, the same respondant mentioned that it helps a lot to see that you are your goal (a given choreography movement) in the screen before the actual action. This feature of step by step learning easily a precise given movement. Finally, one downside of exergames was told: playing in front of the screen during long periods provokes you a headache.

Regarding the question about if they consider they had more physical activity in their normal lives than usually during the trial period, students answered that they think of exergames as an extra activity, not as a main one.This is, they consider exergames as an extra activity to their usual hobbies. I tried to generalize and find out if somehow playing exergames often, their amount of physical activity time could grow, but it seems that, first I should have arranged a session per day to increase the feeling of practicing more exercise and, secondly, I think the respondants didn’t get the main picture of the question and focused just in the trial period. However, one of them highlighted that he believes he has done more physical activity due to

the fact that during trial sessions he didn't have to sit in the school's desk. In pure numbers it meant for the participants one hour more of physical activity per week, wich is a 50% increase considering they have two hours of P.E. per week.

To play exergames it's not necessary to be in a good shape. That was the general opinion among the respondants. Exergames do not require being fit. However, they do require the "enthusiasm and interest for motion" one answered . This is an issue furtherly studied in the psycological aspects of exergames section. I asked them about their opinion if being overweight has an influence when playing exergames. Most of the respondants anwered that there's no influence, except one, that mentioned that "if you are a little chobby you won't be able to play for long periods". It is true that during trial sessions participants had short interventions and time to rest enough so they did not feel tired or even exhausted to the point of giving up a game when they did their turn. But worth to say, as mentioned in the introduction that I played myself several rounds of DDR and Dance Central at home and after 20 minutes of dancing tirenes appeared, both physical and mental. The amount of physical activity is studied in next section.

I noticed that only one of the participants in the trial was more corpulent than the rest, but in my opinion she/he was not overweight. This participant in particular was one of the most enthusiastic and participative during the gaming sessions and did complete all his/her turns succesfully. Regarding overweight topic it was asked as well, if the fact of being overweight could affect the joyfulness or the games results. General anwer was "no, it will not affect"

If there's no special healthy requirements to play exergames, respondants agreed that exergames are suitable for all ages and individuals. Two of the participants said that they suit better for kids and professional athletes "if they don't feel to go outdoors to train in case of bad weather".

In line with the subject, next question was if kids who are not specially sporty could play exergames. Anwers were diverse: " Anyone who really wants", "exergames are interesting and fun", "exergames are more profitable than traditional console games (in terms of being healthy, I understood)" or "if you don't like outdoors exercise, you can experince some physical activity without the need of going outdoors". I assumed with this group of answers that "not sporty" kids can play exergames as well. However, respondants know that exergames are not as profitable as traditional exercise in terms of physical activity as we will see in the next section.

8.2. Physical activity benefits

We made a brief analisys of different researches about the physiological and physical benefits of exergaming. Although this material is focused in the experiences of the players and not in the measured energy expenditure, I was concerned about the results shown. Previous studies as Lanningham-Foster et al (2009) or Maddison et al (2007) agreed that energy expenditure of exergames is clearly higher than traditional console games but lower than traditional physical activities. It is comparable to low intensity exercise as a brisk walk. Bearing the previous results in mind, I wanted to know what the feeling of playing exergames regarding exhaustion was. The consequent questions were: " Did you feel the exergame session as an active hour?", "why?". Anwers went from: "No, it wasn't active. There was too much waiting and sitting time" to " Yes, it was active and fun" or " Only when playing one vs. one mode". Another participant mentioned that he/she turned slightly red and sweat slightly, but not too much".

Keeping my lesson active has always been my main concern in school because kids have enough sitting time during regular theoretical lessons so, I tried very hard to keep the trial sessions active as much as possible. Playing Dance Central, was a succes in terms of activity performed due to the reason that, while one participant was in front of the screen executing the dancing choreography, the rest were practicing as well. So they had the opportunity to practice and memorize the movements before playing and scoring more points. The total ammount of time of physical activity was in the author's opinion acceptable compared to a short P.E. lesson. Indeed came to mind my experiences during the internship of Pedagogical Studies in Finnish schools both Primary and Secondary. I did my internship during the spring and it was Baseball season (Pesäpallo) in a Secondary school. Without having measured data and only through my point of view, the energy expended during those baseball lessons, if not lower, it was the same as the one I perceived in the exergames sessions. With this bold assertion, I try to explain that lessons in P.E. are not always as active as we, P.E. teachers think as it also highly depends on the activeness of the students. The activity performed by Secondary school students during baseball lessons was so low that students the same age could have perfectly experienced the same exertion during a Dance exergame session.

Having mentioned my experience in Secondary Schools, I have to admit that Primary scholars are more active and they run and sweat fully in every lesson. This amount of time and intensity of physical activity is very difficult to replicate during an exergame session.

While playing Kinect Adventures, there was no general rehearsal time and kids had to wait their turn seated. Because they usually played in couples, this meant that two of them were exergaming for a two to three minutes period and the rest waited for six minutes. This is a long time to wait without any other task to perform.

My next step was trying to gather their feelings in an exergame session compared to a regular P.E. lesson regarding exhaustion. The general answer was that they do move more during a regular P.E. lesson. Several reasons were mentioned: “during exergaming I do experience as much as in a regular session but only when playing”. This answer could sound obvious but indeed it is telling us that in case of playing continously, playing exergaming students can have the same exhertion feeling than in a regular P.E. lesson. Note that I always mention exhertion feeling not calories measured. Another anwered was “No, in P.E. lessons I do exercise more because outdoors is more fun”. This is a handicap that regular exergames played with consoles cannot overcome but, as the researcher mentioned in the section of Smartphone’s Applications , being outdoors exercising is another feature offered that can add motivation to students.

One of the main basic skills related to physical activity I noticed in all the activities of Kinect Adventures, was the balance requiered. Several movements had to be done such as jumping in a limited area, lifting one leg while swinging one or both arms and so on, in order to score maximal points.

I decided to go into detail about this basic skill when asking if participants believe that having a good balance to play exergames is a requirement. They agreed that at some level a good balance is needed but not extrictly necessary: “You need it when changing body balance from one side to another”. Other students mentioned that good reflex and flexibility are also needed because player has to go up and down all time. Or, “Yes, it is necessary when you have to stand on one leg and perform movements with your arms”. The following question in the same subject was if they think that playing exergames they can improve their balance skills. A general agreement was told, “Yes, practicing you improve”. As I noted during the sessions, I cannot assert that they improved their balance skills but, by playing the same game in different rounds they learn the obstacles about to come or the specific movement to be done in order to get the maximum points. This is indeed learning by repetition. In the final sessions more exact movements were done, showing a higher level of expertise, scoring higher punctuation and I could say consequently improving balance.

Regarding the game called “Rally Ball”, explained in the “Games used” section, I asked the participants what was the most important skill requiered in order to score more points. Respondants answered that the ability to move all limbs or “all your body”, “even your head” or “to have the ability to move fastly”. Another anwered in a way that caught my attention: “ to move all your body, because sometimes I moved just my arms or legs too little and I didn’t score points”. This answer along with the others given, made me realize that playing exergames gives immediate feedback to the players. This participants realize by himself that he/she didn’t use all parts of his/her body to try to hit or fetch the incoming balls in the game. It is true that balls are coming to a speed that is hard to keep up, fast reflexes are needed in order to anticipate the Avatar’s movement in the speed, during the trial lessons I gave some feedback about using all limbs. Nevertheless, participants realized and also remembered perfectly what was the main issue needed to score more points in this game and therefore to perform better.

I went further asking if in their opinion, playing exergames, in particular “Rally Ball”, they could become better goalkeepers in real football. Participants were not sure about this assertion. One mentioned that “Maybe, when you learn how to use all limbs”. Another gave a confussing answer: “Maybe. For example when you play real football you never know where the ball is going because another player is in front of the ball…”. But I received another fruitful anwer: “I have never played real football (as a goalkeeper, I understood) because I am afraid the ball will come straight to my face”. This answer gave me another clue about the possibilities of exergames. This participant realized about the importance of using arms and legs to intercept the ball in the game. He/she learned this skill in a safety environment without having to fear a painful hit in his/her face. Will this participant develop this safety feeling good enough to be able to play for real and practice as a goalkeeper? This is another subject for further studies.

Carrying on with physical related benefits, I focused on Dance Central game. The participants answerd that Dancing games were sometimes difficult, sometimes not, depending on the choreography movements. One participant admited that he/she tried hard but sometimes made mistakes. I thought that the song’s tempo could be an important factor of success in this game. According to one respondant, the influence of the rhythm “depends on the level of concentration of the player”. For some of them it was not a difficult issue: “I’m fast”. But others admited “Sometimes I got confused” or “Only when the boys make too much noise”. One of the biggest surprises I noticed during the dancing sessions was that not the most active and sporty participants scored the best punctuation. It took time to all of them to learn the songs and get familiar with the rhythm and choreography. It also helped that the console detected if the

player's movement was according to the rhythm. But the important thing was that all the participants requiered more or less the same learning time. The ones with a more active background needed the same time to learn that the ones with a less active background. This feature allowed a fairer competition and, as I will study in the psychological related benefits, the shyest respondant, who admited not having hobbies related with sports, won the dancing competion.

Some participants acknowledged that thanks to the dancing games they felt better dancers. "I can use at the disco the new movements learned here" one said. Another pointed out that " I haven't danced often before but I have learnt new movements and, above everything, I noticed the amount of different dance movements that can be used". In my opinion Dance Central is an excellent way of introduction to dancing skills regarding rhythm perception, spatial perception and propioception. Through the use of this game participants had fun and showed enthusiasm in dancing and developed dancing related skills. Most P.E. teachers would admit that these ingredients are hard to achieve in any regular P.E. lesson where the teacher is trying to develop a dance session. Participants agreed that they have improved their dancing skills which, in my opinion, it me does not mean that they are going to dance better in the disco but they will feel much more self-confident executing any dancing movement in front of others.

8.3. Psychological and mood benefits

The first subject I wanted to ask in this section was about the feeling of being safe and if it was fun or by the contrary, participants felt insecure or had some kind of uncomfortable feeling. Two of the participants understood the question literally and answered referring to the space available: " Yes, it was safe, there was plenty of space. Desks were far away enough". Others, however, understood the question in the way I meant: "Yes, it was fun", "if you fail in the game, you know indeed that everybody failed before and everything is ok", "Nobody is coming close to you to say: haha. It was just fun", "You can play in peace, nobody will pressure".

In my opinion, as P.E. teacher, the pressure pupils feel is a non spoken subject in school. How often do students feel they are "under supervision" of the teacher's eyes? In P.E. lessons it is a normal rutine to ask the kids to perform a given movement or exercise in front of the teacher or even in front of the class. This is an awful pressuring situation to the student who can react to

the situation facing it or, on the contrary avoiding it. Consequences will be, either failing or just going blocked.

When playing exergames, first, participants felt it is a game, not an exercise or practice. This simple fact makes teaching and learning much easier for both the student and the teacher and could have multiple consequences regarding focusing and motivation in different subjects that I will comment in a further section of my research.

Second, as participants mentioned, they did not feel the pressure of performing well to have good results. Having said that, I did tell them that these trial sessions were not going to affect their school marks. Maybe feelings regarding pressure would have been different if the scores on exergames affected their school marks. Anyhow, what comes to teacher's pressure was, in my point of view and after gathering the participants anwers, nonexistant. What about other participants' pressure? It is often as hard as teachers pressure, the one shown by the classmates. Acording to the respondants´ opinion I found the following anwers: "At the beginning I thought it was difficult (exergaming), but then I did it well. All classmates cheer each other" . "I thought boys were about to put some pressure but, no, we were all classmates". What is normally a subject of being ashamed or pressured had become in an example of friendship and respect between classmates. I noticed during the trial sessions,from the point of view of the observer, that participants that were not playing, were focusing in the avatar's performance in the screen, not in the participant who is indeed exergaming. This phenomenon worked as a pressure release valve, because players did not feel other's eyes on them but on the figure in the screen who looks funny. The avatar and its background got the attention of the spectators and consequently participants could play more relaxed. Could this be a key for the less talented students to perform better in front of the screen? Maybe.

Following with the topic of being ashamed, I asked them if they thought it was embarrasing or auckward to play and dance in front of others. Also, it was asked about their first reaction when they knew they had to dance. Answers were as follows: "It wasn't embarrasing. First reaction was I didn't want to dance then it was fun", "First reaction was I don't know how to do this", "First I thought "Help"! everybody is looking at me, but then it was a release to know that no one was judging me", "It could be embarrasing but nobody laughed", "During the freestyle section I didn't know what to do and I was afraid but then it was fun".

According with Susanne Bejerot. Et al. (2011), "Poor motor skills are a strong risk factor for becoming bullied. Prevention programmes that identify, protect and empower the clumsy

children could be an important step to avoid bullying of the most vulnerable children". In their research, they conlude that clumsiness is related with poor performance in P.E. and consequently with bulli victimization. Also poor social skills are also a risk for becomig bullied.

If we put clumsiness and poor social skills together, we have a potential victim of bulling at school. Joining both last assertions and exergames feelings, I would like to point out the experience of one of the participants, the shyest of the group, in order to bring the author's opinion in this matter. The participant had mentioned in the previous questionary to the trial sessions that he did not practice any sports out of school, nor he had any special hobby. I noticed his shyness from the first session. I couldn't say if he was clumsy or had poorly developed motor skills. While playing Kinect Adventures, he did not achive specially high scores like his classmates, neither the lowest. However, while playing Dance Central he achived the best score of the group almost everyday. That was a big surprise for me worth to write down in my notes. Dance Central requiered a higher level of courage in order to perform given movements from a choreography in a certain tempo or speed. Compared to Kinect adventures wich requieres also movements but not as coordinated and fast as Dance Central. I mean, lack of coordination and tempo made mistakes much more obvious to spectators than in other games. Bearing this in mind, the mentioned participant was enthusiastic about practicing all choreographies before his turn and excelled during his turn of dancing. He was able to perceive the song's tempo and body movements that the console demanded. The final moral of this little story is that he gained the congratulations of his peers, boys and also girls (who have normally more developed dancing skills at this age), respect and left every session with a better self esteam.

Have these dance sessions helped him to socialize? Or maybe to find a more secure role into his group of friends? Maybe. I did not measure it scientifically however, it was obvious to notice how happy the student left every session after performing so well in the game.

This enthusiasm brings us to the next topic of this research inside feelings: motivation.

Motivation in school, in general, has been studied for long. Besides, many articles and books about motivation in P.E have been written recently. In order to keep things simple I wanted to begin by the basic question bringing the topic of participation motives to this trial: Why did you want to join this trial? Participation motives are the reasons that given participants have to participate in a given activity (Markland and Ingledew; Hagger and Chazisarantis). Anwers were as follows: "I was interested in playing exergames", "A friend of mine was interested and

pushed me to join the trial", "I have never played exergames before and wanted to give it a try", "I am allowed to play at home when I get good marks so I wanted to play more here". Reasons such as curiosity, enjoyment and personal challenge are likely to be experienced as autonomous motivation and therefore reflects intrinsic motivation. Intrinsic motivation is defined by Brian and Deci in the above referred book as: "The inherent propensity to actively develop skills, engage challenges, and take interest in new activities even in the absence of external prompts or rewards". This is exactly what I felt in most of the participants when joining the trial and confirmed by their answers of the type "I was interested in exergames". And this is one of the advantages that exergames can offer: "intrinsic aspirations will enhance well being because they are more likely to facilitate satisfaction of the basic psychological needs for autonomy, competence and relatedness" (Deci & Rian, 2000). On the other hand, we have extrinsic reasons to participate: a friend´s pressure and the outside reward. Goals such as popularity, pursuit of wealth, good looks or social inclussion are less likely to fulfill basic needs of satisfaction. Because these goals are imposed external by pressures they tend to be experienced as controlling (Ryan et al., 1996) and therefore participants will not engage activities persistently.

I also asked if they came to play exergames with the same level of enthusiasm. One of the participants mentioned that after a long school day it was difficult to find enthusiasm, but generally it was fun. Another said that the change from a theoretical subject to play exergames was motivating. In this matter I observed that certain days some participants looked bored, and they told me that the waiting time for the playing turn was the origin of their boredom. But they suggested inmediatly that in the mean time some kind of warming up circuit could be done. So this put them to participate in the design of the activity.

The next topic I considered was "The winning feeling" related with the motivation to play. The studies done by Bakker et al. (1993) considered that the search of succesful results (winning) is one of the main reasons scholars take part in competitive sports based on agonists values. But they put into question wether competitivity arises in scholars because of a genetical primal necesity or it is reproduced in school because an ideological issues. What comes to the participants in this study, they have the winning issue very clear; When I asked them if winning was important when playing or competing, all of them agreed that it was not the most important thing. On the other hand, they added some exceptions: "No, if someone has a bad feeling", "No, if not everybody is having fun", "If you win, it is important not to rejoice when someone loses". In my opinion all this "If" comments showed that it may not be the most important feeling but

they value as well the success in a given activity. The girls also mentioned that it felt good to beat the boys.

As the reader has surely noticed, exergames are played in a virtual environment, consequently I wanted to know if winning when playing exergames was easier than winning in a real sport situation. A couple anwered a straight "No", but others admitted that "Maybe playing Kinect adventures is easier because there are different games. If you know how to run, you win for your team". In my opinion (remembering the case of the shy dancer boy who success extremely good) once students learn basic movements, and the game obstacles and requirements, it is easier for the not most skilled students to success in these kind of games and even experiment as well the winning feeling against the most skilled students who normally succeed in real P.E lessons.

8.4. Social benefits

With these questions I wanted to find out if playing exergames fostered to improve students' relationships, companionship and how the group interaction is affected.

The first thing students pointed out was: they like much more to play exergames in pairs than alone: "It was better to have fun together and at the same time to compete". The reader has probably noticed that the "winning" factor has been mentioned again. I asked if they received congratulations from other students after playing. They answered that "sometimes", but from my observant´s point of view, during the trial lessons all of them cheered the players together and the players acknowledged constantly that cheering. These phenomena brought me to think that, considering this trial little groups with pupils without deep friend relationships they cheered and supported each other surprisingly well. Also being 12-13 years old, the factor boys versus girls and its hate-love related feelings arose often. They wanted to compete against each other every day, but at the same time being respectful and acknowledging the opponent's skills.

I asked them what the rules of our sessions were. Were there any group rules? I have to point out before giving their answers that I did not give them a speech about the rules of the group, just sometimes a warning due to the over excitement of the game. So the answers about the rules they noticed in the group were: "Having fun all together", "To cheer", "Respect to each

other and don´t bother", "Do what we´ve been asked to do". With these simple rules they figure out, the trial sessions were successful regarding behavior in a group.

I wanted to know more about the internal group dynamics that emerged during the trial. Based on the following answer, we can assert that there were no group leaders: "Colleagues know when to take decisions on equal terms". It is worth to mention that even though there was not a clear bossy student, it was evident that a couple of them, the most mature I could say, were setting the groups dynamics in a "democratic" way. When it was time to arrange the group´s turns to play, or who is going to play against who, they decided it together and accepted in a natural way.

One more issue I wanted to write in this section is the phenomena of gaining new friends and more respect through *exergaming*. As I mention before in the Psychological and mood related questions, one of the students, who was really shy, scored every day the best points while playing Dance Central. I witnessed the respect he was achieving from the rest of the group. I can’t say that “winning” on an *exergame* helped him to become better friends with other kids of the group, but I am sure that he left every session with a better self confidence. And self confidence is a big factor when establishing a new friendship whether it’s the same gender or opposite gender friendships.

8.5. Knowledge acquisition and cognitive benefits

Another factor I have noticed while playing exergames is the acquisition of knowledge in different areas as diverse as language or technology. According with the students, console and computer technology is not easy to learn and handle, especially if instructions for example are spoken and written in English. But they figured out different games' instructions quite fast thanks to the symbology. Students acknowledged that some instructions were difficult to understand but they used the resources of vocabulary from English lessons.

Cognitive benefits of exercise are not as well known, but are as important as the physical benefits. Regular exercise leads to the relief of symptoms of depression and anxiety, mood improvements, and improvements in memory, visual perception, and processing speed. I did not ask any questions about cognitive benefits. In my opinion, the trial participants have not yet the necessary knowledge to consider whether cognitive improvements were achieved during the trial period. So from the researcher's point of view, I could highlight one factor: the immediate kinestesic memory, this is the ability to remember a certain movement. In different games, whether is an acting game like "Rally ball" or a dance game, students learn really fast what were the given movements in order to succeed in the game. Thanks to the immediate feedback of the "tutor" in the game *Dance Central*, participants were able to adjust and learn new choreographies.

9. DISCUSSION

Qualitative research is mainly characterized by seeing aspects from the point of view of the participants that are being studied. The role of the researcher is to understand and infere what is going on from the experiences of the subjects. This phenomenom becomes a difficult task because in one hand, the researcher can't abstract himself from his own believes, background and experiences. And, on the other hand we have the complexity of human phenomenon (Castillo & Vàsquez 2003. 164).

The quality of a given research is determined mainly by the methodological accuracy that was applied. Quality standards for quantitative researches are globally defined and well known. Unfortunately for qualitative researches accuracy methods are not as clear as quantitative. The criteria that allow us asses the accuracy and scientific quality of qualitative researches, is how clear is made to the readers all the vicissitudes that the researcher went through the study process. Along this section I will try to seek and analyze the reliability of the research.

"The reliability of the study is called also repeatability, and is designed to resist the effects of chance, and to highlight the similar results from different measurement times. The reliability of the study is directly proportional to the reliability metrics of the present study" (Metsämuuronen 2005, 65-5). Research reliability refers to the way data results can be transfer to other context or groups and can be generalized.

The main goal of this research was to study the participants experiences while exergaming, not the effects of the gaming itself. Consequently, the responses and further analysis might not be alike to similar studies on the same area. Also, it is important to point out that with such a small group of participants it is difficult to generalize conclusions to a whole population of scholars, especially when subjects were of the same age and the research refers to the feasibility of exergames in school.

However, I do believe that some research conclusions about participants' experiences can be made and generalized to the whole population of 6^{th} grade scholars as they are kids, with similar playfulness, interests and hobbies. If this study was conducted again in another school with the same age participants, I think experiences and feelings will be mostly similar saving individual differences.

As previously commented, this research tells about the participant's experience and feelings while playing exergames at school. This is the main objective of this material and in addition, the author comes to a conclusion of the reasons why should, or should not exergames be played at school. That is to say, always under his point of view.

Regarding the trial group, I questioned the following limitations which in my opinion are worth to emphasize:

1) The participant's age is limited to 6th graders which means 12 and 13 years old. I did not include participants from other age groups. The choosing reason of this age group has been told before but, while developing the trial sessions and later on, writing this material it has always haunted my mind the fact of the limitation of the age regarding the title of the present material; as it refers to the whole population of scholars.

2) The participant's number is very small so generalizations should be made carefully always bearing in mind subjective point of view of the author.

3) The gender and variety of the group represented well all the typology of common students. This means, I consider, that all kind of students were represented in the group: some of them sporty, some not, shy and timid, some of them with a strong self image, some of them mature enough to deduct results and rational answers and some of them not mature enough, and so on.

And finally, what comes to the interview sessions, I assumed that the participants' answers were honest and truthful due to the fact that I was not asking for any kind of knowledge, just about their feelings, and they did not have any reason to lie about their feelings. On the other hand, there's always the possibility that some of the respondents have the same answer as their interview companions because they didn't come up with a rational answer. Regarding this problem I was looking for fruitful answers to my questions so, in case some respondent gives me a "yes-no", "I don't know" answer, I went to the next interviewee and asked the same question. According to Hirsjärvi (2004, 191), it always exists the possibility of misunderstanding the question in the way the researcher intended. In my case being the interviewer, I tried to make myself very clear while formulating the questions, especially when Finnish is not my mother tongue. But it might simply be that participants got confused with technical terminology that leads them to answer "I don't know". Anyhow, the author believes that when interviewing face to face it is easier to perceive if the question has been understood or not. Also, on the basis of the respondent's answers I believe participants understood the

questions as intended. Having all this issues into consideration, I believe the material used for the research is reliable.

9.1. The role of the researcher

As mentioned in the analysis of the qualitative researches, it is imperative that both researcher and participant set aside their own points of view and try to understand the other's point of view. This approach to others' position is crucial to set the roles that researchers and participants play in the research. The setting of roles in the research field affects mainly to key tasks in qualitative researches such as decision making, relationship between researcher and participant and input of information. (Rodriguez, Flores and Garcia 1997)

The first role I performed was the role of researcher: a person who has knowledge of research methodology and possesses a set of skills and techniques that allow him to plan and perform qualitative research. This role has been developed through academic reading and personal experiences on other researches and working areas. In my case, I did not have previous experience doing qualitative research so, I had to teach myself what methodology is the most suitable to gather and infer information. Besides, I would like to point out that, unlike quantitative researches, where one specific methodology is framed and learned, and then the process to infer information is relatively short. In qualitative research it is a constant process that must be developed during the whole period of the research. Research methodology has not been "crystal clear" since the beginning of the research and, for this reason; it has been a constant process of developing, that is to say, how to deduct conclusions from the participants' experiences.

Sometimes the qualitative researcher also takes the role of the participant. During the trial sessions I did not want to take part in the games for two different reasons: first I didn't want to influence the attitude and feelings of the subjects by taking part in their games and therefore have an influence on further results. Secondly, as a practical reason, I could not assume the role of observer and fully focus the participants' experience if I was playing with them. Only a few times I showed the kids how to perform or play certain games but just in order to let them know how it worked or to break the ice in the initial sessions. The fact of showing the students to play or to operate the console was just a matter of saving time due to the lack of time in each session.

Discovering the process takes part in this trial as well, and will be analyzed in the section named Cognitive Related Benefits.

The qualitative researcher takes the role of an external observer and assessor, too. In the first role, it is asked that research performs an analysis and interpretation of behaviors and meanings specific to a group, institution or community without becoming part of them. In the second role, it provides an understanding and /or assessment of a program, an institution, a group or a certain individual. (Rodriguez et al.1997.) As mentioned above, I did take the role of observer during trial sessions by taking notes, pictures and even videos. All this material will be studied together with the interviews to create a set of plausible answers to the research questions.

10. CONCLUSSION AND IDEAS FOR FUTURE RESEARCH

The answers to these questions have been made subjectively by the author of this study through the observation of the participants during the trial sessions. These responses serve us in the same way as a summary of the phenomena experienced during the study.

10.1. Question 1: Could exergames work as a spark to turn on the engine of physical activity and consequently inspire students to practice more classical physical activities afterwards?

In order to find the spark mentioned above we studied the main motivations to play exergames. Participants knew that physical activity is healthy or it is a tool to gain a wellbeing and healthy feeling. They also agreed that exergames promote health by exercising their bodies. The participants agreed that it is not necessary to be in shape in order to play exergames but they do require an interest for motion. And consequently, exergames suit everybody.

They had the motivation to play because they were interested in the game, eager to develop skills, ready to have fun. All these factors are clear signs of intrinsic motivation, which is the one that can engage participants in a long lasting future practice.

Extrinsic motivation was also mentioned as the students wanted to develop their skills in order to have success and better points scored. They felt that everybody can achieve the winning and success feeling also with less practicing time than traditional physical activities.

Regardless of the past experience the participants had, learning a new exergame, its movements and its difficulties, required more or less the same time by all them. So the level of expertise was growing in a fair and homogeneous way. Learning in a safe environment without the risking of physically hurting themselves was also a factor that influenced their learning process. They felt also psychologically safe as they did not feel any pressure input by neither other pupils nor the teacher.

10.2. Question 2: Could students acquire or even develop any motor skills by playing exergames that can be transferred into classical physical activities?

Reviewing the skills I perceived during the trial sessions, the first skill that came to light was that of balance. Both static and motion balance were required in order to succeed in dancing games and sports games. The participants noticed that many movements required a more accurate use of each body limb. So they have to jump, stay in one leg and so on in order to gain more points. Besides, while dancing, balance was required to achieve different choreographies. Kinesthetic perception was another skill that was developed during the trial sessions. The students learned where and when had to position their limbs in order to achieve a given movement or choreography and consequently score more points.

Rhythm perception was another skill that students perceived as important and I consider they developed as well. Obviously, all representation in the form of dance carries an implicit rhythm. In all the choreographies performed by the students, the level demanded by the games was very high. In my opinion, thanks to the attention, memorization and repetition of the movements, the participants were able to assimilate better the rhythm of each song and consequently achieve more points in the game.

Finally, students improved their ability to react to very fast stimuli. In all games, like common console games, the stimuli to which the participant has to react are very fast, with the difference that the player not only reacts by moving a finger, but with his whole body or a member at least. This requires a higher level of tension and attention from the player.

Are these skills significant within the broad spectrum of motor skills? Well, honestly, there are very few skills that improve in comparison to such a large group. But from a positive point of view, they are important skills as well, and these can contribute to the overall improvement of the motor resources of each student. So, I can say that the improved skills can be transferred to the range of skills acquired during the practice of more classic physical activities.

10.3. Conclusion

Electronic entertainment has established itself as an integral part of any person's life in the XXI century so, we must consider ways to work and take advantage of it instead of fight against it.

As I mentioned earlier in "potential benefits of exergames", early studies on energy consumption in these games aroused the curiosity of regular users interested in the scientifical side of exergames. Among these curious users were teachers, and not only of Physical Education. Since the mid-2000s trialing with exergames began in schools in different parts of the world (Barker 2005; Grayson 2010; Dejka 2010). Without further detailed analysis of the studies made in different schools, I could claim that exergames are a useful tool not only from the point of view of the physical education teacher, but applicable to other facets of education and global development of children in school.

It is true that the energy exerted while playing exergames is small in consideration with traditional games and exercises where the physical demand is greater. Even though I shall remark that when I played myself DDR in the easiest level for 5 minutes, sweat came easily due to the inexperience of playing for the first time and the speed of the choreography. Yet, from a more global perspective, playing with exergames rather than traditional video games or just watching TV may replace these hours spent every day in front of the screen by teenagers and at the same time contribute to the recommended daily caloric expenditure. It is also true that, with the increasing media consumption of nowadays children, it is more difficult to get children attracted to traditional physical activities, and this is where exergames can help us: raising the young from the sofa or the gym's bench and get them out to enjoy physical activity with the rest of the class.

Moreover, "It has also been proved that exergames are highly appealing and offer a chance to perform athletically, physically and expressively for people with social or physical handicaps" (Biddle 2004). As exergames are a new platform where special skills are not required, children with less developed skills can perform and feel integrated in a game offered to the whole class. Besides, exergames have the possibility to adequate the level of expertise in order to adapt every individual's skills to the game.

What comes to the economical investment of school in buying exergames consoles: this issue will depend on whether they support a sustainable physical activity over time. The price of a console varies from 200 Euros for a new Nintendo Wii to several thousand Euros for the group

game system like *i Dance* of Positive Gaming. Some may think that consoles or controllers will break soon with continuous use but, with new developments such as the Microsoft Kinetic, children do not have to touch the console at all. Only the teacher will have to connect the game console and organize the lesson.

What comes to participation: it is clearly limited to one or two children per console although there are a few systems mentioned supporting up to 32 players. But the cost of the latest is so expensive that I doubt a public school would invest in that technology. On the other hand, during the trial sessions the same situations as in other studies took place: in some classes when the students were playing/ exergaming, those who were waiting stood aside performing the choreography in order to implement it when their turn came. So this might be a plausible solution to play exergames in little groups.

Finally, we should not finish this study without mentioning the recent "Boom": the app for mobile phones "Pokémon Go". Thanks to this application virtual reality games have been taken to a real environment. The commercial possibilities of this game are enormous. There is probably already some study going on about the physical, psychological and sociological effects of this game on its players.

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