PLAYTESTING THE DIGITAL PLAYGROUND

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ABSTRACT

Being able to be absorbed in play in the digital playground is motivating for children who are used digital computer games. The children can play and exercise outdoors while using the same literacy as in indoor digital games. This paper presents a new playground product where an outdoor playground has been combined with digital games. The playground was tested in natural surroundings in a school yard and the findings about the interplay between digital and analog play are described here. Finally balancing in digital and analog games is discussed.

KEYWORDS

Game design, flow, digital playground, balancing

1. INTRODUCTION

This project investigates how digital games can be used in outdoor playgrounds, where the games are fully integrated. Our case is a new playground series, ICON, by playground producer KOMPAN A/S (www.compan.dk), which the company marketed worldwide late in 2008, and which is to our knowledge the first digital playground on the global market. The development of ICON is based on several development projects done in corporation with researchers from Center for Playware, an interdisciplinary center that combines game design software engineering and robot technology (Lund at al 2005) (Lund and Jessen 2008). The basic idea of the product is to add a digital layer to some of the existing and successful play equipment from KOMPAN.

The aim of the digitization of the play equipment in ICON is to initiate physical play among the generations of children, who grow up with digital games as one of their favorite toys. According to International Obesity Task Force these generations are in danger of unhealthy living, partly due to lack of physical exercise (International Obesity Task Force 2002). Video game research has shown that children learn new digital games by using tricks and skills they used in other digital games. They are learning a new kind of literacy (Gee 2003), and because more and more children are experts in digital games it seems natural, and even necessary, to use this expertise in outdoor games as well to create physical play among children.

One of the challenges for the game designers in this case is to balance games in an outdoor environment where many lively children are gathered at the same time. There are several well-developed theories about balancing digital video games and making fun and interesting screen-based games e.g. Fullerton (Fullerton 2004), Salen (Salen and Zimmerman 2006), and Juul (Juul 2000). The question is how to use the knowledge from video game design in outdoor digital game design?

During the development of games for the ICON playground in 2008 a test facility was located in a school yard at a public school in the small town Ringe in Denmark, where we had the opportunity to investigate

children's play. In the following we will introduce the digital playground, then describe results from observations, and close with a brief discussion of designing games for digital playground. It should be stressed that the games we describe are examples since the playground is a hardware platform with several games and new games can be added continuously.

2. THE DIGITAL PLAYGROUND

The digital playground uses various games to challenge the children to play physically. The playground is divided in three play areas and each area offers different game options.

The first area is a digital top called Digital Supernova, which is circular and about 6 meter in diameter (see L1 in Figure 1 to the left). One or more children can participate by making the top turn. The children can have different roles; some children will make the top turn and others will be passengers. In the center of the top is the game console, which invites the children to play different games e.g. a moving arrow is displayed and the children have to turn the top according to the arrow. This game is played as a competition between children and top. The children can also decide to ignore the display and use the top in the traditional analog manner.

The second area see L2 (see Figure 1 in the middle) is a climbing rack called the Digital Galaxy. It is about 7 meter in length, 3 meter in breath and 2.5 meter in height and consist most of galvanized steel. In all junctions is programmable light diode buttons. The diodes can be programmed to be e.g. red, green, blue, white or yellow. In front of the climbing rack is game console, which can be activated when the child rocks the seesaw in front of the console. One of the digital games is called Colorrace and when the game is executed five of the light buttons will become active and light up, each in a different colour. The players will have to choose a colour each and then chase and touch their color as fast as possible. When they touch the colour will randomly "move" to another buttons in the climbing rack, which they have to touch. The child, who has touched 10 buttons first, is the winner. The digital games can be played by one or more children. The galaxy can also be used traditionally for climbing, exploring, balancing, training and so on.

The third area see L3 (see Figure 1 to the right) is a Rocking top called Rock-it. The height is about 1.3 meter and the diameter is also about 1.3 meter. In the center is a console containing a display and buttons, the digital games are activated from the console. One of the digital games is a maze game where a virtual ball must go through the maze without touching the walls. The players rock the top gently in order to balance the ball through the maze. One or more children can use the Rocking top at a time.

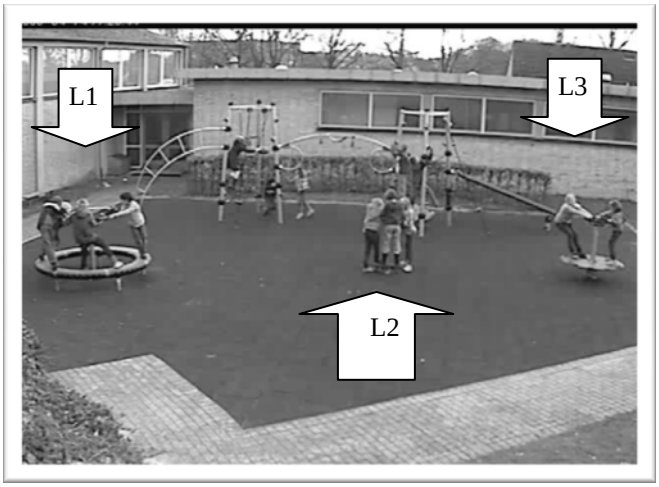

Figure 1: The digital Playground

3. INVESTIGATION METHOD

Digital playgrounds are a new and untried sort of digital game, which are characterized both by demanding bodily interaction and by the lack of the visual representation so wellknown from screenbased games. The interaction is very different compared to computer games, including genres like Nintendo Wii and Sony Eyetoy. It seems obvious that this new sort of digital games can take inspiration from traditional computer games, but at the same time it is also obvious that there are significant differences, which are yet to be identified. For that reason our investigation method was an explorative anthropological approach where findings were induced from the material. As method of analysis we found a comparative approach appropriate. Because ICON is at the same time a digital playground and a traditional playground it was possible to compare how the children played the digital games and how they used the same play equipment without the digital layer. To ensure enough data without spending disproportionate time in the field we decided to use unsupervised video recording. This made it relatively easy to clear away time periods where the playground was empty, which is often the case in Danish school yards. A camera was set up facing the playground. For 14 days the camera recorded from 6 am to 6 pm. The sequences were analyzed afterwards. Most of the playing sessions took place during the school breaks, but some sessions took place after or before school hours. In the end our data consisted of observations of 50 children between 6 and 15 years old . The children were given no instructions in relation to how the digital games worked or how to play. The observations were done approximately two months after installation of the playground. So we observed the everyday use of the playground. The analysis focused on how the children received the digital layer of games and if the interplay between this layer and the play equipment would work at all. We asked the simple questions: Will the children play the games, and will they play more than a few times and a few minutes?, Our goal was to establish a point of view where we are able to talk about digital playgrounds as a *game platform*, beyond the fascination of “new technology”, which often steals the picture when something new emerge.

4. THE ANALOG AND DIGITAL USE OF THE PLAYGROUND

The investigation showed that the children used the three installations in continues alternation between digital and “analog play”, by which we mean play without help from the digital world. The way the children alternated was seamless and our observations showed that the digital play equipment was accepted as a natural extension that at first were examined like any other new equipment and after a short while became a natural part of the playground. The analog and the digital were used in parallel. Below are some characteristic examples of play behavior described. The first example is from the Digital Supernova where about 10 teenagers use the supernova as analog equipment.

1.1 Examples from the supernova (L1)

Figure 2: A group of young teenagers spin

Observation of analog play: A group of about ten young teenagers gradually invades the supernova (see Figure 2). The teenagers are relaxing in shifts. Once in a while one or two rises and make the Supernova spin. At one time the spinning is so fast that one falls of. The pace of the play and informal being together pulsates. Some of the teenagers are more active than others. This group did not use the digital console at any time.
Analysis: The supernova easily contains a lot of teenagers. It gives both room for relaxation and huge energy outbursts. The supernova also provides the possibility to socialize amongst friends in the break. It was, though, hard to find observations where the oldest children in the target group used the digital console. The reason for this might be the digital games embedded are more appealing to younger children and perhaps to smaller groups.
The next example is a younger group of children that uses the supernovas digital possibilities:

Figure 3: Digital play at the Supernova

Observation of digital play: A group of younger children spins at the supernova (See Figure 3) and once in a while one of children adjusts the digital console. After a while the group leaves and one of the girls stays behind adjusting the console. *Analysis:* The younger children found the digital game challenging and the game clearly initiated their physical play in groups. It was hard to find observation where more than four children used the digital possibilities.

1.2 Examples from the digital climbing rack (L2)

Below is a description of the digital and analog play at the climbing rack see Figure 4.

Figure 4: Climbing rack in action

Observation of digital play: At first the child rocks the seesaw energetically. This activates the console. Then three to five children runs and climbs in order to press the light buttons. Some of the children have placed themselves at opportune spots in the climbing rack. The children pushes the buttons in a fast pace. There are also children in the rack who does not participate. *Analysis:* This situation shows the connoisseur's way of using the digital rack, the play leader activates the console and the rest of the gang was divided into appropriate positions around in the rack. The youngest children were more exploring in the way of using the console. The older children were more focused, and it was easy to see a clear role distribution, and they collaborated in order optimize their digital activity. The digital layer created physical play and social collaboration.

Observation of analog play: A girl has been sitting in the top of the climbing rack and set out to do acrobatic positions and somersaults. At the end the girl lands gracefully in the playing field. *Analysis:* There were a lot of observations where the climbing rack was used in an analog way for climbing and balancing and doing all kind of nerve racking somersaults. Thus, the climbing rack both served as an analog and digital installation.

1.3 Examples from the rock-it top (L3)

Below is a description of digital and analog use of the rocking top called Rock-it see Figure 5.

Figure 5: Five girls in deep play

Observation of digital play: Five girls are rocking corporately while they watch the console in the center. The girls have taken of their shoes and they look very concentrated. Often a child sat on the console of the rocking top watching the other children. *Analysis:* There were many examples where children at all ages became absorbed at the rocking top. The group sizes were typically between 2-5 children. If the number exceeded that the game would often become wilder and perhaps not obviously related to the digital part.

5. A GAME DESIGN PERSPECTIVE

Adding a digital layer of games to the traditional analog playground seems to be an applicable direction for devolpment of playgrounds that can improve children's physical exercise outdoor. ICON is in our view a first step and an example of a new kind of play equipment, which we term "playware", i.e. hard-and software that aims at creating play (Lund and Jessen 2005). But in many of the digital games the children spend less than ten minutes, which we believe is the result of the game design. There are important differences between analog and digital games, which we in short will point to in the following.

When we design digital games it is important to use a model in order to structure the game. Since the field of designing games for digital playgrounds are fairly new it might be a prosperous to get inspiration from the world of computer games. The immediate inspiration in the following will come from Fullertons way of structuring games by the use of formal elements (Fullerton 2004). The elements are e.g. game objectives, procedures, rules resources, conflict, boundaries and outcome. Table 1 shows an example of an analog and digital game observed in the playground. Elements with inspiration from Fullerton are used. In the table the difference between digital and analog play is shown.

Table 1: structure of analog and digital gaming in the playground

Game elements	**Analog play: Skipping rope**	**Digital game: Maze game at the rocking top**
Players	3 or more	Maximum 5
Objectives	The participants jump over a rope swung so that it passes. The challenge will rise and change during the game.	To let the digital ball pass through the maze without touching the walls.
Rules and procedures	The level of difficulty will rise during the game. Typically there will be a play master who will suggest the level for next round	When the player rocks in one direction the virtual ball will roll in the same direction.
Conflicts	Avoid touching the rope while hopping while doing impressive moves	Choose between the easiet and fast route in the maze
Balance	The children manually increases the challenge	The increases the challenge according to the algorithms.
Boundaries	The rope	The walls in the maze
Narratives	None	None
Interaction pattern	Multilateral competition	Children versus game
Outcome	To become the child that did the most difficult moves.	To get the virtual ball throw the maze

It is especially in the areas of balancing and interaction pattern the two chosen games differ. The balancing of the challenge level is negotiated in the group in the analog example. And it varies over traditions that children have passed on to each other for many years (Mouritsen 2002). Balancing should here be understood as the balance between skills and challenge. In the digital game the balancing is done according to an algorithm in the software. And the algorithm can be more or less adaptive to the player. In the rope swing the children can increase the level rapidly if all the players are trained or they can do it slower if young and inexperienced children are participating. In the digital maze the relationship between skills and challenge is more constrained. The children can perhaps choose level, but the player cannot set new levels in between the existing ones. So the relationship skills and challenge becomes more constrained in the digital game.

The constrained relationship between skills and challenge in the digital playground makes the game designers role very important in the area of balancing the game. In the planning the designer can think in levels and so on. But in the end it is the end user testing that shows what went well and want did not work in the relation between skill and challenge. In the cases where skills match challenges is a potential for an optimal experience also called flow (Csikszentmihalyi 2005).

6. CONCLUSION

The advantage of the digital playground is the combination of being out door, having fun and using the children's own knowledge about digital games.

Another advantage is that the children isn't limited to play digital. The children can in a natural way swop from digital to analog play and vice versa.

A third advantage is that children without a lot analog playing skills (Jessen and Nielsen 2005) can be inspired to play by the digital games.

The comparison of an analog and digital served as tool for putting focus on the game at a detailed level. It was especially in the negotiation of rules and challenge level there were a difference. The possibility of improvisation was also higher in the analog games. This should not be a surprise since one of the important differences between computer games and traditional, analog games is the fact that rules are materialized in the computer program and seldom changeable. This is a serious limitation, but one which computer games has dealt with successfully for decades. In our view the limitations of the actual applications on the playground were the balancing of the games. Were the games really fun for more than a short while, and how can the games be improved in order to make the children play digital for a longer period of time? .. From computer game research and game development we know, for instance, that increasing challenges are crucial for the success of a game. Levels that today seems so natural in computer games is one of the most successfull solutions, which could easily be implemented in the digital playground.

The main challenge for the next development phases of digital playgrounds is to balance the games. The technology is working as a hardware platform so there is a good basis to make playful games in the future.

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