Bachelor Thesis - Spring Semester 2010

Eco Kids

- Developing a learning game for children with the aspects of user-centered design, social behavior and reward systems

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Abstract

This paper focuses on how to design a children’s game to help them realize that they can have a positive influence on the environment. We present a detailed description and analysis of our work process from brainstorming to the discussions after playtesting our prototype. Playing while learning has been the motivation of our work which is divided into three specific topics: How to involve the users in the design process, what type of social aspects exist in our game, and the importance of a feedback and reward system in the game. We look upon earlier research and examples within these three areas. We designed our game from a user centered perspective to make the users influence and encourage a discussion and awareness about environmental questions in a way that isn’t negative. While designing our game we wanted to shed a positive light upon a serious issue and bring the environment into the topics of play and fun. In our research we discovered that focusing on small subjects and tasks the children started to discuss the complex theme of the environment. We focus on the interaction with the children and using their influence to make decisions in our design process. Involving them helped us to see that there is not only one way of learning. In this game, the users learned from engagement and discussion, which ended up being the most important part of the game play.

Keywords
Game, play, learning, user-centered design, social behaviors, coveillance, feedback, reward system.

Introduction

“Popular culture today is more complex than ever, and, in some cases, it appears that young people are learning in more innovative and powerful ways out of school than in.”

James Paul Gee states this in the foreword of Playing to Learn where he argues that games are in fact a tool to be reckoned with when it comes to learning (Hutchinson, 2007 pg. xvii). Since we had the opportunity to explore and develop a game for children created exclusively for learning, we saw it as a very interesting field. To combine learning, games and playing we want to express that the players can experience gameplay in an environment flourishing with possibilities.

As a starting point we collaborated with the game design company Ozma and their game WeProject. To evaluate their game and see how the game mechanics would apply to children we designed a newer game with the same structure as WeProject. We designed a physical game with digital implementations to encourage children’s way of play and we wanted to use play to encourage a new way of thinking. We also wanted to start a discussion that would plant an environmentally friendly thought in their lives.

WeProject was made to help organizations and companies to work with change and breaking up habits, trying to get the company to easier adapt to new routines. With this in mind, we changed the game to be more about children’s way of play. To get children to change their habits and learn a new behavior with the help of reward systems and a play perspective on learning was our goal. We also wanted to see social interaction and how positive peer pressure and peer teaching can work as a reinforcement of play and also as a reward.
The main question that we have explored is how to support learning and affect a behaviour with a game. Our focus was to change the target group from adults and companies to school classes with children from nine to twelve years old and to also implement the digital parts of WeProject into a physical game.

We decided to divide our main question into three subareas: user-centered design, the social part of games, rewards and feedback in games. These are the three questions that we’ve investigated.

- How can we include children in the design process, when we are creating a game with optimal interaction and learning possibility?
- How does coveillance (peer to peer monitoring) contribute to the game play in a learning game? We want to see how coveillance in an analog game resembles the one that occurs in an online game, how it emphasizes and bring it in to a physical game with digital elements in a context of a class room.
- How can you develop a reward system in a game and the game’s key elements to aim in teaching children how to be aware about their own positive and negative influences on the environment?

In the beginning of the design process we visited a school and talked with a group of children to get to know what they knew about the environment and how they looked upon the world. We later on followed this group of children and they where involved during the whole design process. We got creative inspiration from them during a small drawing session and they told us about what kind of games and competitions they had in school and what they thought about them. We also discussed what was fun and what kind of motivation they had for doing different things.

In the first chapter you will get a thorough description of Ozma and its WeProject as well as a concise description about both our physical and digital prototypes.

In the methodology chapter you will read about the design methods behind our design decisions: Brainstorming, a look into user-centered design, observing, interviews, drawing session, contextual inquiry, prototyping, playtesting and scenarios.

In the next chapter you will find the section about the process of making our game Eco Kids in chronological order. Followed after the Process Chapter, you will find a chapter dedicated to a thorough description of our game.

We will discuss how we went about to make this game from a user integrated perspective, considering that we involved the children in the game design from the very beginning. Then we will discuss how the social interaction among children effects the game play when their friends can see how the other players are doing in the game. Lastly we discuss how a feedback and reward system based is vital when designing a game.

In the final chapter you will read the conclusion of our thesis work. We will discuss the knowledge we can take with us from this project and apply to other areas of design.
Background

Teaching while doing and having fun was the inspiration to our project of helping children become environmentally aware. The concept of Eco Kids is to encourage children to become interactive with a game while also having a physical tasks in school and at home.

Ozma

Ozma is a game company started in 2006 by Bobbi Augustine Sand and Karin Ryding located in Malmö, Sweden. Ozma focuses on user experience design. This type of design process is centered around studying the user's needs and behavior. Through focusing and circling in on the experience, Ozma's goal is to capture the experience and create a product from that. Various customers and partners that Ozma has cooperated with are: Malmö City, Upside Studios and Damanco.

In November 2009, we contacted Ozma to ask if it would be possible to cooperate with them on a project for our thesis work. Ozma responded positively to our emails and suggested for us to study a project that they had created, the project’s name was WeProject. Ozma was very encouraging and open to what we could do with WeProject.

WeProject

WeProject is web-based social network for co-workers. It was designed for companies and it works as a game structure empty of content. The company can design what content they want the game to be based upon. Content can be everything from saving electricity to increase gender awareness in a working environment. WeProject was made to stimulate change. The web-based game was a digital meeting place for the workers to register actions or tasks they have done also allowing co-workers to see their progress. The participants worked individually while simultaneously being apart of a team. For example, if a player registered turning off a light, points would be given as instant feedback to the individual player as well as the team he or she was on. The players would also be given the chance to take on certain tasks or activities and when completed they would be awarded with points also known as “Givits.” WeProject was also used as a digital social point for the participants where users could update their own profile, comment on other’s profile pages and even monitor other’s progress in the game. The game was tested during a period of six weeks. In image no.1 you can see an example of how a profile page in WeProject is displayed.

“Through a task and award system, the users are encouraged to...
give ideas, be active, and integrate with fellow players.” (Augustine Sand, B. Ryding, K. 2009) The game was designed to fit different types of users’ play preferences, this was done by having different types of points to be won. These points can be divided up into: creativity, logical and participation points. Ozma found that through giving the players a variety of ways to win points that they would be able to learn more about themselves and what type of game play they preferred.

With WeProject as our inspiration, we adapted the game’s methodologies and created a newer version of the game. Changing the target group to kids from nine to twelve we had to reconsider many parameters. The following is a description of our game consisting of both the physical and digital parts.

Our Definition of Play and Game
Play and game are important aspects of any game, the difference between these two words is that games are goal-oriented whereas play is not. Games have a well defined beginning and end while play doesn’t follow the same pattern. We will discuss this further in the chapter Reward System in Games.

The Parts of the Game
The game consists of two parts, the physical and the digital. The digital world can take over our role in the game as the moderators in the future (we will later discuss this). Below is a conclusion of how the two parts work together and in the following section you will get a more detailed description of the different parts of the game.
different categories of trash that are present at the trash dump: metal, glass, paper and plastic. There are two trash dumps that need help to be cleaned by the participants on the teams.

Each player can earn points for themselves and while doing this they also earn points for the team they are on. The players earn points by doing different tasks both at school and at home. The trash dumps are represented by paper cut outs of trash piled from the ground up. Under the trash pile, there is a clean environment with animals waiting to be revealed. Depending on how much the leading player on the two teams have earned for the day is the deciding factor to how many pieces of trash gets to be sorted that day. Image no.2 shows all the parts of the game. The two leading team players who have the most points at the end of the day get to take down pieces of trash and sort it into the container it belongs to: paper, glass, metal or plastic.

The Digital Part of Eco Kids
The first prototype was made of paper, however the tasks the kids received in the beginning of the class were presented to them on a computer, this being the Alpha version, as you can see in image no.3. The digital part of the Alpha prototype was to simulate a webpage where they can "log in" to their “profile” and get the different assignments of the day. They choose their game piece and then a description of the days tasks are explained by their individual game piece. Lastly, they are asked if they accept the assignment and this concludes the digital part of Eco Kids. While tested, the kids found the first page confusing and in the
development of the Beta version we focused on improving the digital part and making it more clear and comprehensible. In the Beta version we also created a way to display the three different days assignments, as you can see in image no.4, a feature that wasn’t present in the Alpha version. We didn’t have the opportunity to test this version on the kids, however we tested it on adults. We then discovered that the flow and layout was comprehensible.

Introducing the Players
The participants in the game consisted of a group of nine children who attended the after school group at Malmö. Their ages ranged from nine to twelve years old. We decided to use fictitious names and we will mention them as: Isra, Tommy, Nadja, Sven, Bert, Sherin, Isabelle, Amir and Marie.

The following section introduces the metodologies we have used in our design process.

Methodology
For investigating our three different focus areas and how to go about developing our game, we used several different methods. Some of the methods that we used were: Brainstorming, interviews, drawing sessions and game testing. In this chapter we will give you a brief understanding of what we used, why and how we went about in our process.

Brainstorming
In the beginning of our process we worked with Brainstorming to generate new ideas. In the book *Game Design Workshop*, Tracy Fullerton writes that when "There is no time to wait for that moment of inspiration to hit; you need a more formalized system of idea generation" (Fullerton, T. 2008, pg.150). Brainstorming is a powerful tool and a really useful method when you are working in a group. Afterwards you can use mindmapping to categorize your ideas, see an example of this in image no.5. When creating a mind map you start with the core idea in the center and let ideas connected to this radiate outward. (Fullerton, T. 2008, pg.154)

When using brainstorming we articulated a statement for every session and during a set amount of time we tried to come up with as many ideas as possible that had to do with this statement. The time set was often around five minutes and we used post-its to write down our ideas (see image no.6). During these five minutes there is no time for criticism and all ideas are good ideas. After a session we took all our ideas and tried to put it into categories. We sorted out all ideas that were unreasonable and kept on working with the ideas that we found interesting.
User-Centered Design

Every day we come across designed objects that do not work the way we want them to. It’s either complicated to understand or it’s just not usable. This leaves users frustrated and unable to complete the task that they want to accomplish. "User-Centered Design" (UCD) is a broad term to describe design processes in which end-users influence how a design takes shape."(Abras, C., Maloney-Krichmar, D. & Preece, J., 2004 pg.1) There are many ways of involving the user in the design process, but the important part of this concept is to involve the users one way or another.
"The major advantage of the User-Centered Design approach is that a deeper understanding of the psychological, organizational, social and ergonomic factors that affect the use of computer technology emerges from the involvement of the users at every stage of the design and evaluation of the product. The involvement of users assures that the product will be suitable for its intended purpose in the environment in which it will be used. This approach leads to the development of products that are more effective, efficient, and safe." (Norman, D.A. & Draper, S.W 1986 see Abras, C., Maloney-Krichmar, D., Preece, J. 2004. p.10)

The term User-Centered Design originated in Donald Norman’s research laboratory at the University of California San Diego (UCSD) in the 1980s and became widely used after the publication of a co-authored book entitled: User-Centered System Design: New Perspectives on Human-Computer Interaction (Norman, D.A. & Draper, S.W 1986 see Abras, C., Maloney-Krichmar, D., Preece, J. 2004. pg.1). We have used UCD by observing the children, interviewing them and being in their school environment, and you will read about these methods next.

Observing
In the article The Role of Children in the Design of New Technology, Allison Druin writes about involving children in the design process. She observes the children from four different perspectives:
- Child as a user
- Child as a tester
- Child as an informant
- Child as a design partner

"Each role has been defined based upon differences in how adults relate to children, what stage in the design process that children use technology, and what goals researchers may have for inquiry with children." (Druin, A. 2002. pg. 3)

In our design process we were inspired by the second and the third role, tester and informant.

Tester
In the role of tester the children try prototypes of technology that are under development. They are observed while they are testing and also asked questions for direct comments about the experience. The goal of this role is to help create new and better technologies before they are released to the world. While testing the prototype adults can ask the children for direct feedback. They can do this by asking questions like, "What features did you like?", "What was fun?" or "What was boring?" It is important to know that all the brainstorming and designing is already developed by adults. Children do not begin their role as a tester before the prototype is created (Druin, A. 2002 pg.9-10). While doing this, researchers look to understand the child tester’s activity patterns, likes/ dislikes and changes in learning (Druin,A 2002. pg.12).

Questions that you want to figure out while observing the children when they are testing the prototype are: What parts of the technology are confusing that can be changed? What parts do children like so that new features can be added? Can children learn with the technology so it can be marketed as an educational product? Where are the bugs that need to be addressed before release? (Druin, A. 2002 pg.12)
Informant
In this role children play a part in inspiring the design process. They contribute to the process in different stages. Before any technology is developed the children are observed with existing technologies and they are asked to give feedback on paper sketches. When the technology is developed the children are asked for input and thoughts. The children are involved when the researchers believe that they can give them valuable information. (Druin, A. 2002. pg.14). This method is similar to the methods used in the role as a Tester. What differs from those methods is when these observations happen and how directly it can affect the design of new technology (Druin, A. 2002. pg.16).

How We Used these Roles
When we looked at the children as testers we went to their school environment, watched how they played with our prototype, and observed what they liked about it and talked to them about what they thought was fun, exciting or boring. For us this was a very good way to actually see what worked and what did not work with our prototype. Examples of this are when they did not really understand our digital prototype's interface and when some of the children got bored when they didn't have things to occupy themselves with constantly.

We have also used the informant role. We did this first by visiting the school just to observe the kids, talk to them and ask them about their computer-, play- and game habits. Then we created the prototype based on what we found out at the first visit. After that, we went back to the school and tried the prototype with the children. After the game test we had a small interview session with some of the participating kids.

Interviews
When preforming interviews with children there are two main things that you need to consider with great importance. First, the purpose has to be clear for the interviewer, and secondly, you need to make up a plan that can work as a support for the interviewers memory. An interview is usually split up in three different phases. In the first phase, you have a warm-up session where you ask relaxed and easy everyday questions, here you also clarify the purpose of the interview and if necessary you tell the interviewee that everything will be done confidentially. After this you work your way into the interview phase where you ask questions and discuss subjects that are the focus of the interview. In the final phase you need to think about finishing in a positive way. It’s good to focus on the effort given by the interviewee and that it is appreciated no matter what answers are given.

General things to think about can be to conduct the interview in a quiet setting, to listen actively and give verbal feedback showing that you understood the interviewee correctly. If notes are to be taken this should be done by another person, so that the interviewer has full attention of the interviewee. You also need to consider to not ask steered questions and questions that assume that the interviewee has certain knowledge or experiences. This can lead to incorrect answers given in attempt to please the interviewer (Brenner, S.O., Heimdahl, I., Hjelmquist, E., Johanson, J.E., Lennar, Å. & Nordin, G. 1984)

Whit this in mind we started to do interviews with the children at
Möllevångsskolan. We started off by asking them general questions of what they like to do and then worked our way in to questions concerning the environment, internet communities, games, competitions and rewards. By just sitting down in a relaxed environment where they felt comfortable to talk to us gave us spontaneous answers. We used the questions that we had created and asked them during our visit, but the children did not notice that we were interviewing them. You can study all the details about our questions in the appendix.

Drawing Session
We arranged a small drawing session to get inspiration from the children. We brought paper and colored pens and asked the children if they wanted to participate in a drawing session/competition. Most of the children responded quickly that they wanted to join. We talked to them about the environment and we asked them to draw the first thing that came to mind. Some of the kids drew an environmental super hero, another drew two heros picking up trash from the ground and Bert drew a poo factory, you can see these drawings in the images no.7 and 8.
Contexual Inquiry
The methodology of Contextual Inquiry helps the researchers to collect data about the user in their own environment. Contextual Inquiry means to do observations of work practice in its naturally occurring context, like the drawing session we describe earlier. The users are observed while doing typical activities and the researcher asks questions when needed. We observed the children in their school environment because that was the place where the game was to be introduced.

Since we were three people in our research group we used one of us as an communicator and two were taking notes and collecting material such as photos. The communicator talked to the children, played and laughed with them. We used this method because we didn’t want to make the children feel like they were being tested, or as they were to give the right or the wrong answers. We wanted the kids to act "normally", but we found that the children got excited and enjoyed being photographed when we had the camera with us.

Much of the work in doing a contextual inquiry is reading between the lines of the facts that you collect. These facts must be analyzed to uncover the design implications (Cooper, A., Reimann, R., Cronin, D. 2007. pg.58). After each visit at Möllevångsskolan we took all the notes that had been taken and tried to interpret the meaning of the children’s actions. You can find our analysis in the section called "Observing the Children in Their Own Environment."

Prototyping
"Prototyping lies at the heart of good game design" (Fullerton, T. 2008. pg.175). When you are making a prototype you want to make something fast and easy to be able to test you ideas, see what works and doesn't work as quick as possible. There are many types of prototypes such as: physical prototypes, video prototypes, and software prototypes. We decided to create a physical prototype to be able to test our game quickly. The important thing to remember is that you are not designing the final design, but you are trying your ideas and concepts to see what works before making the product. Making prototypes allows you to focus on the game play and not the technology. The prototyping tool was a way for us to test the game quickly. We used paper, scissors, printed images and glue to create the physical version of Eco Kids.

Scenarios
"Imagining a story about a person using our product leverages our creativity to a greater power than when we just imagine a better form factor or configuration of screen elements."(Cooper, A., Reimann, R., Cronin, D. 2007. pg.110)

Before we visited the school we tried to play the game ourselves. Doing this we used the techniques of a scenario and role playing. To start, we drew comic-book-like sequences of how we thought that a play session would look like. How would the children react? We also used role playing and pretended that we were the kids playing the game only to see if it was possible to play. We found that the paper prototype worked as we wanted it to, but
that there was problems with the point system, we tried out the point system as you can see in image no.9. We then changed the system so that there was an opportunity to get one hundred points a day, through the different assignments and challenges. This gave the game a balanced game play. Using scenarios also gave us a feeling that the children would think the game was fun.

Playtesting

"Playtesting is something that the designer performs throughout the entire design process to gain an insight into whether or not the game is achieving your player experience goals." (Fullerton, T. 2008, pg.248). There are numerous ways of conducting playtesting, but the overall goal is to get useful feedback from the users to improve the game (Fullerton, T. 2008, pg.248).

When we playtested we asked the children’s teacher to pick eight kids that would be willing to play with us for three days. We brought our paper prototype and mounted it at the school. We explained to the children that this was only a test of our game and that they could tell us about their thoughts at any time while playing. We introduced the rules of the game and tried to let the kids take as much initiative as possible throughout the game. We played and guided the children. Two of us were game leaders since there were two teams who needed instruction. The third member of our team took notes and photos of the sessions. More reflections and thoughts about our playtesting can be found in the part "Playtesting the Game".

image no.9 One scenario of us trying out the point system.
The Process

Our interest lies in the fact that you can learn with games. You can work with games to achieve a change in your behavior and attitude. Games can affect your habits and you can be able to try out new activities that you didn’t know you were able to do. In our game we wanted to work with changing their environmental awareness. We wanted to make the players aware of their habits and give them an area where they could try out new mannerisms in a fun way that was modern and not an obligation.

Finding the Players
To know what children do, what they know and like, we needed a group to work with. We started to contact schools and got a connection at Möllevångsskolan in Malmö, Sweden. They gave us the opportunity to collaborate with the after school group. The children came to this group when their school day was over. First, we made an appointment to come and observe them for three afternoons during one week. Later on in the process we came back to test the Alpha prototype.

Observing and Interviewing
We conducted both the observations and interviews with the children the first three days. To make them feel comfortable and easy to talk with we sat down and drew with them. We tried to ask them questions and see what their imagination came up with when we asked them to draw something about the environment, computer games or other themes. For the interviews we had structured some questions, but we ended up having to improvise with the questions in attempt to steer the conversations in the right direction.

Hard Facts
After observing the children, we wanted to gather facts that we could bring forward in the game, such as simple changes in their behavior and everyday life that they could practice. We wanted them to realize that the existing knowledge they had was great
and that they can make a change in the world. We wanted to put emphasis the small things so that environmental awareness wasn't to complicated for them to understand and that it is easy to do. We found several tips about the environment at www.konsumentverket.se that inspired us, but mostly we wanted to focus on the things that they already had some knowledge about. Examples of this were: taking the bike as transportation, recycling trash, returning bottles and cans for a refund, not to throw garbage on the ground or outside, turning off the lights and other similar small mannerisms that anyone easily can implement in their everyday life.

Starting to Prototype

After reflecting about our observations and interviews we had many ideas of how our game would take shape. We started to brainstorm around the different parts of the game, we had ideas about everything from a complete web-based game to a big room for the whole physical representation of the game. We came up with the idea of a trash dump as a physical representation quite early and from there we continued with the game development.

We knew that we wanted to make a part of the game digital and started quickly to build a simple paper prototype, (that you can see in image no.10,) for how it could look and what we could use in the game system that a digital part could contribute with.

We started to think with the help of storyboards and sketches for how we would like the game to work. Then we discussed how the kids might interact with it. After a while we split up the game into different parts: The physical part with the individual status bars and the trash dump (teams score), and the digital part with the computer generated challenges and assignments.

Now we will take a closer look at the different game parts of Eco Kids.
Description of the Game

We decided to have eight players, four children in each team to make it possible to implement game testing with the after school group. In the beginning we wanted the game to be played by larger groups of children such as whole school classes with up to 25 - 30 children in one team. The kids played individually, but at the same time the two teams competed against each other. To focus more on the game play we decided to playtest it on a smaller group.

Game Pieces and the Status Bar

Every player gets their own game piece (image no.11) to represent themselves on their status bar (image no.12). The game pieces are designed to represent one of the four different categories of recycling that we chose to focus upon in our game. We designed two different looking figurines for every category so that the teams would have unique game pieces.

The game pieces are placed on the status bar to represent the kids progress in the game. The points for the different assignments were counted in multiples of ten, so that smallest amount they could earn was ten. For every ten points they earned they could move the game piece one step. On the status bar the children started at zero and the highest score they could get was three hundred. Through being able to win points easily and often, we wanted them to feel enthusiastic about playing the game. The status bar was both a way for the children to be able to see how many points they had collected and also to have control over the other players status and progress in the game.

The status bar has three stages, also known as Milestones. The first is at one hundred points, the next at two hundred, and the last at three hundred when the game is over. At the milestones the players earn a Milestone Badge showing that they have moved up in the game progress.
Assignments and Challenges
We had different assignments for each day they playtested the game. The idea was to have one big challenge daily, with one additional quiz. In total, we playtested three different challenges. The challenges were all based on that the participants were able to be creative with the environment as the focus. (We will describe the challenges in greater detail in the next section) We also had two quizzes that were either knowledge based or attitude based. The questions were to test their knowledge and what kind of attitude they had towards environmental questions and behaviors. These quizzes can also be used for the participants themselves to take a step back and reflect upon their own behaviour. (You can find the quizzes in the appendix.) In addition we also had a home assignment were the participants were able to collect extra points by implementing new behaviors in their home environment.

A Trash Dump as the Team's Score
The two teams have their own trash dump. These two trash dumps are shared among the four players on each team. The trash dump is a representation of the two teams progress in the game. This "trash dump" functions as the status bar for the teams. The trash dump consisted of one picture for each team, (see image no.13) that we covered up with "trash", laminated pictures of recyclable objects that could be separated in to four different boxes labeled; paper, plastic, glass or metal (see image no.14). At the end of the day, the individual in the team that has collected the most points will remove the same amount of trash he or she collected in points that day and ends by separating it. By having this actual recycling moment in the game we wanted to emphasize that trash separation is a good behavior for the environment. In the end of the game, the team that has the least amount of trash wins the game.
Involving Children in the Design Process

How can we include children in the design process when we are creating a game with optimal interaction and learning possibilities? By using inspiration from the children’s creative minds and looking at previous research, create a good web based learning environment where the fun factor doesn’t compete with the learning goals, but complements it (Druin, A. 1998. pg.22).

When we are designing it is easy to make assumptions about how users, in this case children will approach the product. It is easy to make decisions based on what we as designers “think” will work. As the author Druin says:

"Children have their own likes, dislikes, curiosities, and needs that are not the same as their parents or teachers. As obvious as this may seem, we as designers of new technologies for children sometimes forget that young people are not ‘just short adults’ but an entirely different user population with their own culture, norms, and complexities" (Druin, A. 2002. pg.1)

Therefore we decided early in our process that we were to include the children in our design. To understand our users we used (UCD) User-Centered Design.

Observing the Children in Their School Environment

When talking to the children we found many interesting things that we hadn’t thought of before. By observing them we noticed things like need of structure and schedules, they want to be seen and the willingness of showing us how good they are at doing different tasks. We got to see their wonderful imagination and creativity. When we spoke to the children we found out that their knowledge about environmental matters could be improved and that maybe they didn’t always understand what we were asking.

During this session one of the girls that we call Isra drew an environmental superhero and named him Big Foot. She told us about all the features that she had given him. Big Foot’s feet can smell the evil people who are making the world dirty. She also told us that the evil people smell like garbage and the good ones smell like roses. Big Foot has multiple arms to easier defeat the evil guys. He has one big ear to hear all the bad things that happens in the world. He has a big satellite on his head to be able to watch TV when he feels like it. He lives in a space ship and he has a bag to suck up all the garbage from the world. (You can see the drawing in image no.15)

We tried to interpret all the children’s actions and verbal feedback. While doing this we noticed that they talked about the good verses the bad side. This made us wonder if children see an obvious difference between good and a bad sides, or is it just something that the kids often come across when they play games or watch movies. The children’s imaginations ran away with them and they expressed that something has to be big to function well. An example of this is Isra’s story of Big Foot’s big ear and how it has to be large for him to hear well. Or having multiple arms to easier defeat as many bad guys as possible.

The teachers told us that the kids recycled cans to save up for a Nintendo Wii. Some of the children told us that they were selling old clothes and toys to be able to buy a Wii of their own. This
showed us that children even in that young age know that you have to collect money to buy things in the real world, or points in games to reach your goal. We implemented this way of thinking in Eco Kids reward system, where you have to collect points to get the badge that you want.

We also talked to the children about the environment. The discussions showed us that they did not have the knowledge that we thought. They just said that they did not know so much and it felt like they only said things that they thought we wanted to hear. They associated the environment with nature and plants. They also talked about that you have to pick up trash from the ground. As soon as they felt uncomfortable about what to talk about they said - "I can't come up with something to say right now." We got the feeling that because they did not know so much about the subject their imagination ended. We noticed the same reaction during the drawing session. When we told them to draw whatever they could come up with that had to do with the environment, they couldn't come up with anything to draw. If we had asked them to draw a princess they would all have known what to draw. The theme of environment could be hard for the kids to draw because of the abstract meaning. The word princess was easier for them to interpret because of it being so concrete.

How do we make the theme into something fun? We don't want the children to stop playing because they don't get enough stimulation. The author Allison Druin writes that:

"For example, if children become bored by a task an adult asks them to do, they may simply walk away, start to distract another child, or even begin to find interesting ways to bang on a computer keyboard. They are 'acting out' rather than directly confronting the issue with a discussion as an adult might do." (Druin, A. 2002 pg.2) We saw this change in attitude when we wanted them to talk about things that they didn't know much about. The children asked if they were allowed to leave the table or just without asking they ran away to do something else.

We asked the kids if they would play a game that was about the environment. The answer we got was that they would play it if they won something materialistic. Would it be enough to win virtual points or would the kids have to be rewarded with material things? During our visit we also attended one of the English lessons. At this class we observed that these children had a need of knowing the schedule and what was to come up ahead of them. The teachers had to repeat everything that they were to do and they had the children write everything down in their calendars.
Do the kids have to know what the next step in the game is? Or is it enough that they know that they are going to play?

Besides these observations, we realized that some of our expectations going into the project were correct. One example of this is that children as well as grown-ups get frustrated when things do not work as they want it to or that things get more interesting to attend when it is a competition.

We also tried to see what happened if we told the children that the drawing session was not only a drawing session, but a drawing competition. This created a will to join and some of the kids even got nervous that they would miss the competition if they went out on the playground for five minutes.

After our observations we developed our prototype and then we went back to the after school group to playtest it, which is described in the next section.

Playtesting the Game

Day One

We started by putting up the individual status bars and the teams trash dump on two different parts of a wall. After presenting ourselves and the theme of our game we split the group up in two different teams. We then started the game by letting them choose their game piece that was to represent them as individuals.

They were then able to put their game piece on the status bar and we gave them each ten points for participating that day. After this we called them over one by one to sit next to us and watch the slideshow and navigate it similar to a web page (See image no.16). In the slide show they read the information of what they were supposed to do in the game that day.
Challenge one: Color in your game piece!
The kids each got a game piece (shown in image no.11), but without color. This challenge was to personalize their game piece with their own choice of colors.

Challenge two: Answer a quiz about the environment. (See the day one quiz in the appendix)

When the quizzes were handed in, we counted their points for that day and they could move their game piece on the status bar. Then we gave them the home assignment which consisted of the paper log where they could record their different behaviors for that evening. (The home assignment is shown in image no.17). For the next day’s assignment we told them to bring a toilet paper roll. After all this we checked who was the leading team player and let them remove the trash from their teams trash dumps, improving their teams score. We also handed out the badges for the children that had reached the first Milestone at one hundred points that day.

Reflections About Day One

The first day of playing Eco Kids was quite chaotic. Explaining the rules to the children took longer than we had expected. They needed to be concentrated and listen in the beginning, but at times it was difficult to get all nine children to do that. On the other hand, when they did listen and concentrate, they could really get into the game and were very enthusiastic. When coloring in their game pieces, the majority wanted to color their pieces in the same color as they were displayed in the slideshow, while a few used their own imagination.

Isra got inspiration from our game and created her own for her friend after playing Eco Kids. She wrote down rules for her friend sitting next to her in class, so that she would score points when she followed them. We were told this by one of her teachers who had observed Isra doing this after the first game day.

When we handed out the homework task paper, many believed that they were supposed to fill in the papers immediately. We then had to instruct them how they were supposed to fill in the paper. When we then gave them the day one quiz, it was hard for some of the children to understand all of the questions. We noticed that the reason behind this could be that some of the words that were used were too advanced or borrowed from English.

It was difficult for them to understand the purpose of the game as well as it was hard for team to see which team was leading.
the game. We think that this may have depended on the trash dump being too abstract for them to understand which team was in the lead. If the team points were represented through displaying numbers instead of pieces of trash, maybe they would have understood better.

**Day Two**
The second day we started similar to the first day with the slide-show and reading the instructions for the challenges that day, and followed by giving them the Attendance Points. Challenge one: Answer a quiz with questions about your everyday habits. Challenge two: Something old becomes something new! Make a creature shaped pen holder or something from your own imagination from a used paper roll. We offered them instructions over how they could create different animals with their paper roll. Most of the kids did something from their own imagination, such as Isras cat that you can see in image no 18. When everything was done, we counted the scores from the quizzes together with the points for reusing the toilet paper roll, and then the children moved their game pieces. We then let the children that had reached the Milestone that day pick their badge of choice as a reward. We checked who was the individual leader in each team and gave them the reward of removing the trash.

**Reflections About Day Two**
After day one, we realized that we had got a grasp of how to structure up and how to guide the game and players from the start. This allowed that we could observe them more closely. Even though the kids had only played Eco Kids the previous day, they remembered the routine that they would be given Attendance Points and were eager to move their game pieces when they arrived.
We observed that the players watched closely over each other and made sure that no one moved their game piece more than they should. If one player did this, the other players expressed this to us immediately. After completing game day two, it was interesting to see how different players fell into the many roles of game playing. We observed that there was a rule checker, one looking for loopholes and one who was point fixated, we also noticed that there was a quiet player and several attention seekers. When given the "something old turns into something new" assignment some of the players embraced being creative and created other creatures than those that we had given for inspiration. On the other hand, there were also others who asked if they "had to" do the assignment. In this case, we could have implemented the creative points as Ozma did in WeProject, awarding those who had thought outside of the box with extra points.

On Game Day Two, we also found out that similar to when we did the interviews, that you sometimes have to improvise when testing a prototype, especially when testing it with children. When awarding the kids for their hometask points, we had to consider that they only had an evening to complete the tasks. For example, when one of the children wrote that they had turned off one million lights, we had to give the points considering how much time they had to complete the task.

**Day Three**

We started the third day off with giving the Attendance Points and the kids moved their game piece one step. This day we only had one assignment and felt that the slideshow was unnecessary. (Its main purpose was to evaluate a layout and that had been done the first two days.) We started off by putting the children in their two teams and then we started playing environment themed charades (See image no.19). One of us acted as the game leader whispered the words they were to act out. The children acted out
charades one by one and we gave one individual point to the one that answered correctly then they also got one point for their team. When all the participants had played charades once, we counted how many points that were left on the teams score, and announced the winning team. We had a trophy for the team and the individual winner got a medal (this is shown in image no.20).

Reflections About Day Three
On the last and final day, the children knew the routine even if this day was different compared to the first two. Since this day didn’t contain a quiz, we started immediately to play. When playing, we did not have to inform the children to raise their hands before yelling out the answer, they did this automatically. This showed us that they still had their classroom mannerisms even at the after school program. This day also showed us a reappearance of the different game rolls. The children helped us in making sure no one cheated. An example of this was when one of the game leaders was whispering into Nadja’s ear to explain what she was to act out. Sherin started to hum so that no one could cheat and hear the keyword.

After the game of Charades, we had a discussion with Sherin and Isra. Similar to how we felt, they also said that the first day was chaotic. They expressed that they would have enjoyed having a “cool down” session with us at the end of every game day where we could have discussed what we went through for the day or simply just to talk. The girls also said it would have been fun to play more than three days.

Conclusions and Reflections About the Involvement of Children in the Design Process
Children think, wonder and reflect in other ways then we could imagine. While observing the kids playing, talking, drawing and using our prototype we found out facts that we used to base our design choices on. They contributed to our work just being who they are, kids.

Before visiting the school we tried to think of what the kids would like and think was fun while playing a game. We also made assumptions about how much they knew about being environmentally friendly. When we sat down to gather our notes after our first day we found that we didn’t have a clue how the kids thought, played and what they knew before we actually observed and talked to them. Just by observing and playtesting we found that children have a wonderful imagination and creativity. They got nervous when they didn’t understand a certain word and that children have different backgrounds and therefore different levels of knowledge. By using the methods of User-Centered Design, observations, interviews and drawing sessions we involved the children in our design process and gained knowledge about how Eco Kids was to be developed.

Design choices that we made were inspired by the children’s actions and thoughts. They seemed to feel safer having a schedule that told them what to do and what the next step was. Therefore we structured our game so that they got thorough instructions every day that they played. The game pieces that we made where inspired by their drawings and choices of color. The fact that all the children seemed to enjoy showing us and one another what
that they had done, gave us the idea to make the status bars big. We also put them up on the wall so that everyone, even the kids and teachers who weren’t involved in the game could see them. Involving the user in the design process was a comprehensive part that influenced all our work. From this perspective we could work with different parts of the game. All users are unique and we learned as designers that this creates possibilities to find creative solutions.

After studying children’s interaction in the classroom we applied our knowledge and took the theories from research about social network games to contribute to our game. We wanted to see if coveillance in an analog game resembles the one that occurs in an online game in a similar way. In this chapter we will specially take a look at this type of behavior called coveillance and see how it acted in a game that is based on both web technology and physical elements in the offline classroom.

In the foreword for the book *Playing to Learn*, James Paul Gee writes about children’s ability to learn with video games, "Many video games are deep and difficult. Their gameplay is built on a cycle of hypothesize, probe the world, get a reaction, reflect on the results, and re-probe the world to get even better results. This cycle has much in common with experimental science." (Hutchinson, D. 2007. pg. xxviii) This cycle, that Gee talks about, is just what we wanted to bring to the children that we developed Eco Kids for. Even though the prototype was not a video prototype the kids had to explore the world, and discuss with us and the others to discover the game’s borders and limitations. They were with us and sat the boundaries and rules for the game, and also made sure that their peers followed the rules. Since our game is meant to teach about recycling and the environment we also thought that it was important for them to understand that the tasks were to be done in their personal lives and not in a video world. We wanted them to think about recycling and other environmentally friendly choices in their daily life.
Coveillance

In Eco Kids the point system is designed so that the children themselves will be a part of counting their points and moving their game piece on the status bar. Because of this they become a part of the game system that makes sure that the rules are followed. We wanted to design for the following type of behavior called coveillance.

Coveillance is described by Mann, Nolan and Wellman as a "... condition, where peers can see both the recording and the presentation of the images, [this] is neither "surveillance" nor "sousveillance." We term such observation that is side-to-side "coveillance," an example of which could include one citizen watching another." (Mann, S., Nolan, J. and Wellman, B., 2003 pg. 338)

Taking advantage of the children's strong sense of fairness we expected to see manifestations of this type of behavior. In Massive Multiplayer Online Game's (MMOG's) coveillance is a more explored behavior. But in an online world you need to specifically design for it and this has risen into an vivid discussion. In an article about the online game Wow (World of Warcraft) Taylor says "... it (the game) would quickly lose its capacity to amuse if there were no competitors or spectators, at least potentially." (Caillois, R. 2001, pg.37) He goes on: "Even when the player could in principle conveniently play alone, games quickly become a pretext for a contest or an exhibition, as has been observed in kite-flying or cup and ball." (Caillois, R. 2001, pg. 39-40)

Observing Coveillance within Eco Kids

The children seemed to be very eager to move their personal game pieces immediately as they earned points. Since they were so eager it was difficult for us to know who had already moved their game pieces when we were ready to count their points. It was in situations like this that the coveillance came in the picture. If a child already had moved their game piece then the other children soon would tell us that this had been done. When we then asked he or she, they would answer truthfully because of the pressure of their peers. Some of the kids came up to us beforehand and told us that they already moved their game piece and then it was up to us to write this down and make sure that the
points weren’t counted twice. If we ever by accident forgot one of the kids or counted someones points twice the other children immediately told us.

We observed a very efficient behavior of coveillance in this group of children. The kids vividly discussed among each other if someone could have moved their game piece already and in that case how many steps. We never had to instigate these types of discussions, they kept track on each other all on their own. We just had to interfere sometimes to put an end to the discussion, if it seemed to develop into an argument (you can see one of these episodes in image no. 21).

Since the structure of our game is designed in the way that the children themselves act as a part in the boundaries of the game we had to design for this type of behavior when we developed our paper prototype into a digital game. In the precursor for this game, WeProject, the game was based upon that everyone could see what the other participants were doing. We observed that by being aware of the positions of their peers they became very motivated to take on new challenges, asking us what the next step was as one of their peers passed them in the game.

Social Learning within Games

To be able to monitor your peers and friends is also a part of what makes the game social. As Susan El-Shamy lists her top ten reasons for training with games, number six is that "Games encourage socializing, games let you be social. [...] Games allow for mixing, mingling, and meeting others. This also means hearing the opinions of others, discussing content with others, and having others reinforce the learning." (El-Shamy, S. 2001. pg. 23)

This gives us another reason to use games in learning situations, you have others to reinforce learning. The part of a game where the kids start to teach each other how to play the game, how to score points and how to behave correct within the game.

Steinkuehler describes a situation in an MMOG (massive multi-player online game) where the experienced player (Myrondonia) takes a novice (JellyBean, Steinkuehler’s caracer) "under her wings". Steinkuehler writes that: "Myrondonia teach her two different things [...] one is the social practice, the other is the kind of person/elf Myrondonia want JellyBean to be." (Steinkuehler, A.C. 2004. pg. 527)
Steinkuehler also points out that "There is early over-learning - extended practice coupled with immediate feedback from both the game system (e.g., error produced death) and other participants - and one’s progress and accomplishments are clearly represented in some way, if only by a displayed increased level of experience and its concomitant increase in social status." (Steinkuehler, A.C. 2004. pg.527)

**Observing Social Learning within EcoKids**

Peer teaching and over learning both contributed to a very social experience for all the children as they participated in our game. The kids were quick to encourage and discuss with their fellow players about their progress and why someone was in the lead. They learned fast how to see where their game piece had been before and often remembered how many points they and their friends had scored the previous day. The kids showed a very effective coevillance that also made it easy for us, both to count the teams collected points during a single day and also gave us the feeling of having everything under control.

We had several episodes where the kids demonstrated peer to peer teaching. For example, Sherin on several occasions instructed Marie to count her points so she would get to move her game piece on the status bar. We also had episodes where someone wasn’t there to keep up with the game. Then, when they had returned, the other kids were eager to tell them what they had missed. An example of this was when Amir had to go to a language course and Bert had a help session with his homework then the other kids quickly got them up to date as they returned.

**One Group, Two Teams?**

Since the kids were separated into two different teams they could clearly see who was in lead within the team, but to see which team that led seemed to be hard for them to know. They frequently kept an eye on each other to see who, individually, was in the lead, but they never said anything about the different teams. The teams never really grouped up together except for the charades the last day. They competed more as individuals. This was likely due to the fact that we didn’t really have any tasks that was solely for the sake of the teams. Instead the group as a whole formed a team that excluded the other children in the after school group. All the individual tasks they performed at the same time, and all the children in our game group kept an eye on each other, not separating the ones on the other team from their own team peers.

During the assignment with charades, the big group was put in their teams for the first time, just separating them by two different tables (see image no.22). To be able to keep the score we gave the team points and let them remove trash when a team member answered correctly. The player who answered correctly also received individual points. We thought that these team points would lead to cheering in the teams but we only observed the happiness of individuals.

Even though they were split up in their two teams, they didn’t make any difference between their own team mates and the ones in the competing team. They had applied a few rules of their own, the person performing the charade, was the one to choose who
could answer, and everyone raised their hand when they wanted to answer. They didn’t choose just their own teammates to answer, but called upon them as individuals. This turning the charades into an individual competition instead of a battle between the teams. Since the feeling of togetherness in the group as a whole probably was greater and this out ruled the feeling of togetherness in the teams, leading to that the children rather competing individually within the large group. And as we could see it, the lack of team competition wasn’t a loss for the game play, or for the purpose of the game.

If we would want to emphasize more on the team spirit in the game, there are a few elements that we could put greater focus upon. During the change of the teams score the other kids were not watching the procedure the first two days. With the two teams we wanted to simulate that the race was for example between two different classes, but then they wouldn’t have worked so close together, doing everything together. They wouldn’t have been able to watch each other in the different teams so closely, we could have separate the teams more, putting them in two separate rooms. Then give the teams score a context where both groups could see it after the game session (and not during), to trigger their curiosity to find out which team was in the lead. But still, this was not a problem for the game play, just an interesting observation to keep in mind for future testing.

The after school group consisted of more kids than the eight that participated in the game, there where a more distinguished border between the participating kids and the kids not playing, which in this way formed a team with the eight participating kids. The children interacted among each other in the game group mostly as individuals, they never spontaneously formed groups that
were just based on their two teams, they often crossed the team boundaries and it didn’t seem to hinder them in any way to interact among each other. Though the children in the after school group, that weren’t involved in the game, were a bit interested in what we were doing, they couldn’t really interact with the other kids since we always stayed in a separate room. When the day was coming to an end, the children immediately split up and run out to the other kids, showing off their Milestone Badges for their teachers and the rest of their peers in the after school group. Then they instructed their fellow peers, in the after school group that didn’t participate, about the game.

The group also influenced the individuals within the group to participate. There were a few individuals that had a greater influence on the rest of the children. We noticed that when we had persuaded these key kids to participate and be excited about the game the rest followed more easily. This also worked the other way around. When the majority of the children got enthusiastic about a challenge the more skeptical children’s followed and were influenced by their peers’ mood.

When we talked with some of the kids after playing the game they said to us that they would have liked to finish each day with some time together talking to us in a more calm way, and to just be able to relax together. We hadn’t thought about this factor at all, but feel that this is something to consider in the future, to be a part of importance to implement in the game play. As El-shamy actually points out that besides being fun “Games are relaxing; they can counteract stress and worry about learning. Games can make learning enjoyable, even when there is little interest in the material. The pleasure in the playing of the game spills over into the entire training event.” In an after school group, it might be preferable to emphasize on the relaxing quality of a game. When the school day is over, the kids do need some time to be relaxed. (El-Shamy, S. 2001. pg.22) We realized that the part where the children had an opportunity to sit down and discuss and talk about the environment probably was the most valued part in the end. For further developments this should be something that we should open up our design for. Not giving it a special part like discussion tasks, but just a change of view point.

Conclusions and Reflections About the Social Aspects of Eco Kids
In this chapter we have discussed how our game influenced the children to learn by socializing with each other. We have also talked about how peer pressure can evoke peer teaching and coveillance. We believe that our game clearly shows how children influence each other to learn about abstract subjects with the help of concrete methods and metaphors. We can clearly see a positive effect of the coveillance that naturally occurs in a physical offline game for learning in a social context such as an after school group. If you want to design for the opportunity of discussion within a group, coveillance is a great way to give a push in the right direction. When you have a live and open group, coveillance is such a natural part of social behavior that you can’t get away from it. To design for socialization often brings coveillance and we think that this should be regarded as a positive step rather than a negative. We want to accent the fun part of watching and being watched which was expressed within Eco Kids. We also want to emphasize on the fact that the children so
clearly expressed that they liked to discuss these questions with us. Games always stir up conversations and opinions and by watching and listening we learned that the kids are more then happy to teach each other new knowledge.

Reward Systems in Games
Games with reward systems have been used in homes, schooling institutions and in work environments to improve behaviors and encourage the users involved. The key factors in a functioning game consist of: instructions, role-playing, feedback, tasks and rewards or privileges. With this in thought, how can you develop a game and it's key elements to aim in teaching children how to be aware about their own positive and negative influences on the environment?

To understand how games function, we will discuss what basic elements makes game what it is. What do life and games have in common and what make them different? Is there a difference between the act of play and game? How can we relate these factors to Eco Kids? What dose the existing feedback, reward, and point system look like in Eco Kids? We will start by studying these two terms: game and life.

The Game of Life
In our daily lives, we do things either directly or indirectly to satisfy our personal needs. In our modern age, we have many choices to make with an abundant amount of alternatives.

"The human being is a wanting animal and rarely reaches a state of complete satisfaction except for a short time. As one desire is satisfied, another pops up to take its place. When this is satisfied, still another comes into the foreground, and so on. It is a characteristic of human beings throughout their whole lives that they are practically always desiring something." (Maslow, A, H. 1970, pg. 7)
Everyone has experienced this feeling sometime in their lives. An example of this could be if you have bought the latest telephone and shortly after there is a release of a newer and better one. In contrast to life, games have a set of predetermined rules and a clear set of goals to be reached by the player(s). Because we know the parameters, it is easier for us to make decisions in games. The fact that the decisions in games are not life-changing or irrevocable as they can be in life makes it easier to handle.

"Games provide a safe arena for practice. Games can provide repetition and reinforcement of key information and give feedback... The safety and structure provided by the rules and boundaries of the imaginary world of a game are conducive to testing out new knowledge, exploring different ideas, identifying weaknesses, and practicing new behaviors. Within the context of a game, players are more open to trying out new ideas and behaviors." (El-Shamy, S. 2001, pg.22)

It seems that in games, we have more influence on our current situation which many times can be the opposite in real life. "It's not about having control, but about exercising control. It is only when the outcome is uncertain and we feel that we can affect the outcome that we experience that we are in control." (Hejdenberg, A. 2005, part one) Most games are programmed for the player to learn from their own mistakes, thus encouraging the continuation of play in hopes of beating the competition or beating their own personal score. Games can be seen as a controlled getaway for many, allowing us to take a breath, live another life, and escape from the pollution of real life’s exhaust fumes.

In Eco Kids we want to provide an environment that you can relate to in real life, but with the outlines of a game. To make it possible for children to implement a behavior that they have learned from the game into their real lives was an objective when designing.

**Play & Game**

The words play and game go hand in hand, they compliment each other. So what exactly is the difference between play and game? We will continue on by studying what play means.

The author Roger Caillois describes play in his book *Man, Play, Games* through quoting the famous German author, Friedrich Schiller. "Play is born of a surplus of vital energy, not needed by the adult or child for the satisfaction of his immediate needs, and therefore available for the free and pleasant transformation into dancing [...] Play is the child of work." (Caillois, R. 2001, pg.163). Caillois draws parallels to the words written by the German psychologist, Karl Groos, "Play as pure activity, without past or future, and freed of worldly pressures and constraints. Play is a creation of which the player is master. Removed from stern reality, it seems like a universe that is an end in itself, and only exists as long as it is voluntarily accepted as such." (Caillois, R. 2001, pg.163-164)

Now that we have taken a look at what the word play means, we will now study game. As Raph Koster refers to it in his book *A Theory of Fun for Game Design*, game is "a rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the
outcome, and the consequences of the activity are optional and negotiable." (Koster, R. 2005, pg.12)

With the previous definitions, we understand that play and games are similar and that they obviously have a strong connection with one another. However, we can constitute that the difference between play and game is large. Games have goals, and the majority of the time, the goals are predetermined. We also know that games have a life-expectancy, with a beginning, middle and end. Whereas, play does not necessarily need to be built upon the same pattern.

The goal of Eco Kids is to learn about the environment, to reach this goal you need to play your way through the game. This factor builds a strong connection between play and game and offers an opportunity to take the knowledge with you beyond the game.

Goals- The Basic Units of Gameplay
Games must have goals to allow us to measure our progress in the game's life. Goals need to be set at a decent level so that we can invest time, interest and skills to reach the goal, otherwise the goal's existence is ultimately meaningless. The author Mihály Csikszentmihályi refers to the state of mind when a person or player is completely immersed in what he is doing as being in "flow." He states that: "the reason why it is possible to let oneself be completely swallowed up in an experience of flow is that the composition of goals are most likely to be clear and that the feedback is immediate."(Csikszentmihályi , M. 1990, pg.79). Csikszentmihályi explains the definition of flow by giving an example of a chess player and the importance of the goal in the game of chess. The player's goal is to take out the opponents King before the opponents takes out his own King. Every move the player makes in the game is an update through feedback to communicate how close or far he or she is to their goal.

Next we will take a look at what feedback is and the importance of its presence in games.

Feedback
When teaching something new, often there needs to be a strong motivation factor. Feedback is a common way of motivating the player to progress in their journey to their goal(s). For us to understand that what we do in a game is important and that we are progressing, feedback is vital. "We may fail in certain attempts to reach our goals, but if we get enough feedback along the way, we can still feel that we are on the right track and that our invested efforts are paying off. Feedback is not only about being told that we are doing well. It is just as important that the activity is laid out in a way where we can constantly judge our own progress." (Hejdenberg, A. 2005, part one) Feedback can be given in both digital and physical representations. In Eco Kids, feedback is represented through points and Milestone Badges. These rewards will later be discussed in the paper.

Similar Existing Game Structures
The following are examples of similar game structures that were
sources of inspiration while designing Eco Kids. The followig is also a description of the different game aspects to help create Eco Kids.

**The Scouting Movement**

Eco Kid’s feedback system was inspired by the Scouting Movement, also known as the Scout System. The purpose of scouting is to be apart of an informal education where youths can learn through doing activities outdoors, indoors and by completing services to help others. They are part of a group, but act individually and receive points individually. The system is based upon being assigned tasks with the aim of teaching one new skills or to help others. The system encourages a helpful and conscious attitude to how one can affect others and to have a positive impact on a current situation. Upon completion of a task, the scout is rewarded with a Merit Badge that is to be worn on the their uniform. Each badge is a symbol of the specific area of work that the Scout has learned about. You can see an example of scouts with their Merit Badges in the image no.23.

"The emphasis on "learning by doing" provides experiences and hands-on orientation as a practical method of learning and building self-confidence. Small groups build unity, camaraderie, and a close-knit fraternal atmosphere. These experiences, along with an emphasis on trustworthiness and personal honor, help to develop, responsibility, character, self-reliance, self-confidence, reliability, and readiness; which eventually lead to collaboration and leadership. A program with a variety of progressive and attractive activities expands a Scout’s horizon and bonds the Scout even more to the group. Activities and games provide an enjoyable way to develop skills such as dexterity."

(World Scout Bureau 1998, pg.9)

Similar to the scouts, the players of Eco Kids work in a team but also work individually. There is also an emphasis on "learning by doing" in the game.

**The Token Economy**

Another system that WeProject and Eco Kids are similar to is an idea that was created and most prominent during the 1960s called Token Economies. This system has been studied by both psychologists and economists worldwide. The Token Economy System was designed to help encourage desirable behavior in classrooms, correctional facilities and even in hospital environments.
Similar to the Scout System, the Token Economy System focuses on assignments being given and in return the player receives a reward, in this case, the reward is represented in the form of tokens. "The subjects of token economies receive wages in non-reproducible tokens for work performed and are charged payments in terms of tokens for goods consumed." (Kagel, J. 1972, pg.1) Tokens are known as Givits in WeProject and Milestone Badges in Eco Kids. In contrast to Token Economies used during the 1960’s, Eco Kids was tested in an educational environment and not in an institutionalized place. The participation was completely optional in Eco Kids. Although the test environment and user group was altered, the basic structure of Eco Kids is similar to the game methodology of Token Economies.

Points and Reward System in WeProject and Eco Kids
In WeProject, the reward system is also based upon points. Everything a player does gives them points. Logging into the system gives them one point daily, leaving comments on others players profiles gives the players points. When a player has gained enough points, they are rewarded with a Givit. He or she can use their Givits for an investment. Each investment is worth different Givits and can represent different interests.

The system was made this way so that the player could choose to use Givits in a specific investment or to keep their points for other investments that were worth more (see image no.24). If a player decides to buy an investment, an icon appears on the players personal page so that others can see what they have invested in.

In Eco Kids we didn’t have any investments. Instead we had Milestone Badges that the kids earned upon completing a certain stage in the game. We made this decision since we wanted a way for the kids to get instant visual feedback. If we had a point system similar to WeProject it would require a longer period of time for them to collect points and become eager to make an investment.
Feedback and Rewards in Eco Kids
During our observations the children stated that winning a coupon for free food at McDonald's would be an ideal reward and a suitable motivator to be apart of a game. They also stated that receiving a free movie ticket would be fun to win. We saw these suggestions of rewards as not being optimal for Eco Kids considering that they did not have a strong connection with the game. We wanted the tasks, rewards and the overall message to have a straight-forward and strong connection.

In order to encourage the children, we decided they could win points similar to how one would receive when playing a board game or even video game. Since we weren’t going to rely completely on giving something physical, we would be able to measure the amount of motivation of the players in the game and how eager they were to learn through the point-winning system.

For the feedback, we decided on a minimal physical reward system. In attempt to encourage the children to complete the three levels, they would receive Milestone Badges just as one receives upon completion of a task in Scouts.

Point System
The following is a description of the variety of ways players can win points in Eco Kids.

**Attendance Points**
In Eco Kids, we wanted to encourage the players every step of the way through the game. As in WeProject, the children were given the equivalence of "log in" points which were represented in ten Attendance Points daily. The Attendance Points were given to them in the beginning of every game session. The players earned ten points allowing them to move their game piece one step on their individual status bars.

**School Task Points**
There were daily tasks in Eco Kids. In the beginning of every game day, the children were presented with a digital task presentation where the instructions of the tasks were given. The first two days tasks consisted of the following- Day One: Color in your game piece. Day two: Something old becomes something new. These two tasks were to encourage participation in the game and get them to use their creative minds.

The final game day’s task consisted of participating in a game of environment themed Charades. When we were going to plan the point system for the final game day, we were unsure of how to award the children, individually, team-wise, or both. We thought it would be good to encourage them both individually as well as encouraging teamwork so we decided that the players were given ten points individually and one point to the team for every correct answer.

**Home Task Points and Self Recording**
The players were given a task sheet to be done at home the first two game days. The task sheets were made to be used as a record of the completed tasks that they had done at home for the previous evening.
Some examples of these tasks were: water flowers or plants, recycle bottles or cans and turn off lamps/machines. The players were to record the completed tasks and how many times they were done. The next day the group was then rewarded with points for the completed tasks from the day before. This part of the game was based completely upon honesty. As we discussed before some of the kids had recorded turning of an incredible amount of lamps, which wasn’t possible during one evening, an example of this is displayed in image no.25. This puts the childrens’ honesty to a test. The kids weren’t dishonest, they had just misunderstood the assignment. We decided not to have minus points in Eco Kids because we figured that not moving forward and getting left behind is a consequence in itself.

**Quiz Points**

Through the game, the children were given quizzes which consisted of a set of five questions to test their knowledge about the environment. Upon completion, the players were rewarded with points according to how many correct answers they had (max 100 points for the first quiz, and max 50 for the second quiz). For some questions there was a half right answer making it possible to win ten points instead of twenty. An example of this is: You are in a store and you are hungry and want to buy something to eat. You buy: 1. Bag of individually wrapped chocolate pieces. 2. A plastic bag of bananas. 3. An apple. For this question if the player answered number 2 they received ten points and if they answered number 3, they received twenty points.

**Milestone Points and Milestone Badges**

After every hundred points, the children had completed a milestone. They were then allowed to chose a Milestone Badge. Inspired by the Scouting system, we designed the Milestone badges to be similar to what a Scout would be given upon completion of a task.

The symbols of the Milestone Badges were of symbols to represent the level that had previously been completed and the images displayed on them were of the theme for the day, as seen in image no.26. There were pins on the back so that the kids could wear them on their clothing if desired. There were eight pins total (plus three extra) for every Milestone level completed, one for each child, three levels total with max three hundred points. We wanted the children to be able to win one pin daily. For them to be able to accomplish this, they were given the chance to win at least 100 points daily. Some of the children chose to take off the pin from the back and taped the image onto their game piece instead of wearing it themselves.
To individualize the badges we gave the badges a different background color, so that there was only one pin in the specific background color. The player that had come longest for the day as well as completed a level was the first to choose a badge with a favorite background color. This was to reward the children when they did well and had collected points fast.

**Team Points**
At the end of each game day, the player who gained the most points in each of the two teams was allowed to pick trash from the their team’s trash dump. The amount of trash to be picked was determined upon how many points the leading player had earned for the day. If he or she had won 120 points then they were allowed to take down and sort twelve pieces of trash.

**Final Day Reward**
After the completion of the game, the player that had gained the most points in the game total was rewarded with a Eco Kids medal that he or she could wear.

The team with the least amount of trash in their trash dump at the end of the game was rewarded with a golden plastic trophy filled with eight apples. The winning team could decide if they wanted to share the reward of apples with the other players, which they did. We gave them this opportunity to share the reward as a symbol that they had all completed the game regardless of who had the most or least points in the end.

**Possibility for Extra Points?**
During the game, some of the players asked several times if they could receive extra points for things they had done or things they owned that was connected to environmental awareness. An example of this is when Tommy brought an environmental friendly desk light and placed it on the table so that everyone could see it and asked several times if he would be rewarded extra points for owning it. We didn't reward this attempt since it didn't work within the boundaries of the game. Instead we discussed the advantages of this personal belonging to encourage this way of thinking.

When we gave the children their home task log papers, many of them started to fill in immediately that they had turned off one million lights in their life. It was difficult for them to understand that the tasks were to be done at home and that points would be
given the next day. We had to moderate and decide that even if one player wrote that they had recycled 1,000 cans, we gave them ten points. Even if other players followed the rules and did the tasks set before them, there was others who wanted more points and were creative in finding ways of how to win them. Even if these players were not rewarded with points, it was interesting to study the different types of players in a game. Some can consider these observations as a chance to cheat or it can be seen as a chance to further develop the game where we could give creativity points.

Conclusions and Reflections About the Reward System in Eco Kids

When playing a game, it is optimal that the players are engaged and interacting. Designers want them to feel rewarded for their actions while playing and learning. We created feedback possibilities and used them often as an inspiration for the players to do better and progress in the game. We think that this made the kids eager to continue playing and learning.

During the design process we learned that we needed to have various ways of point earning, to encourage the different play preferences and to give them the opportunity to win points in different ways. The tasks were designed to be hands-on and a fun way to win points. The home tasks were a way to bring their environmental thinking into their homes.

The tasks were concrete enough to be done easily and more importantly, they were created to give the children an opportunity to start thinking about the environment.

The Milestone Badges were used as reinforcers. To stimulate team work we could have given the team Milestone Badges or a common reward daily. They used their Milestone Badges to show off to their peers and the other students. They also wore them on their shirts going home, keeping them for the future. We hope that the badges, in these cases, can work as a reminder of Eco Kids and the knowledge that they have taken with them.

We gave the winning team the trophy showing that they had won it together, trying to bring a feeling of team completion. The purpose of the medal was to motivate the kids to progress in the game and to compete with each other. With the help of feedback and the different rewards, we feel that the kids learned from the game.
Conclusion

We went into this project by using Ozma’s existing game mechanisms of WeProject. We went on to evaluate WeProject by changing the target group as well as the format of a web-based game into a physical game with digital enhancements. We discovered that children learn very differently than adults and are more creative with the game tasks. When adults need small concrete tasks to change their habits it is more important for children to focus on the discussion and their thinking process. Given a certain task, children gladly take it on and are very creative without questioning. We want to encourage individuals to learn in different ways.

As with all individuals, there are two different outcomes given from the same source of knowledge. We think that by keeping it simple the children had the opportunity to learn in their own way and to reflect over their knowledge.

For a designer it is very important to keep an open mind and be accepting if the players use the game in different ways. Even though all games need rules and structure, we realized that when children are the players in a game, sometimes these rules need to be softer and more flexible. In a game with an abstract theme such as the environment, the point winning system may not need to be the most important factor. We think that it is more important to focus on the involvement of the players and their discussions with each other. While designing a learning game, we find it to be more fulfilling to see a game being played that stimulates growth in the subject at hand, rather than just for the sake of winning points.

In the beginning of the design process, we thought that this technological game, would bring a certain outcome. Then when we playtested our game we had to let go of our exceptions and embrace the children’s engagement and ways of new thinking. Instead of trying to control the situation we learned to go with the flow and instead see what would happened and how it all would turn out. Even though the children didn’t react the way we thought they would, we saw that the kids engaged themselves in the topic in their own way.

In the point system of Eco Kids there is a possibility for encouraging children to engage themselves in an important and current topic. While reflecting over our observations we realized that by focusing on the small distinct elements that the children could easily start to think about abstract and complex subjects. We realized this by comparing the discussions with the children that we had during the drawing session, to the conversations during the playtesting days. We learned that even though we were the designers and instructors the children saw us as conversation counterparts.

For future research, we have discussed that it would be interesting to follow up if the children are still thinking about their actions and influence on the environment after completion of the game. We would like to know if they took the discussion of Eco Kids into their homes, spreading knowledge of what they have learned. We also would like to study if the game would bring forward the same vivid discussion even if we weren’t there to guide the players. A possible way to test this would be to further develop the digital version of Eco Kids where the computer acts as an instructor.
Now in the end of our design process, we can answer our main question about learning and affecting behaviors with a game. We learned that it’s important to consider the following: Go with the flow and share the control with the user, because things don’t always turn out the way you expect. While designing a learning game the point system doesn’t have to be the most important factor to focus your design on. Users learn from engagement and discussion. Keep an open mind for that individuals learn in different ways considering that everyone has different learning abilities, backgrounds and experiences.
The Questionnaire

Warm up
Did you think the lecture was any fun?
Did we interrupt you?

Informing
We are going to talk to you about computer games, competitions and the environment, and we really want to hear what you have to say about that. We will not tell your teacher or your parents what you say to us. We will also take notes, but it is only for us to remember what you said later on.

Computers in school:
I saw that you have/don't have a computer in your classroom (do you have one somewhere else?)
Do you use it often?
Do you use a computer at home? Or at a friends house?
What do you use your computer for? School work? Play? Games? Communities?

Communities:
Do you use any communities online where you talk to your other people/ your friends? Have you heard about Facebook, Myspace, Lunarstorm, Helgon.net, Skunk or Bilddagboken?
What do you usually do on those websites?
Why did you start using it?
Do you only write to you friends or do you play games there as well?

Computer games:
Do you play computer games?
What kind of games do you usually play?
Do you compete with you friends while playing?

Competitions, rewards, motivation:
Do you have any other competitions at your school?
If yes, what kind of competitions? What do you think about them? (fun/boring?)
What are they like? Is there rules? Do you play in a team or individually? Do you ever compete against another school or other classes in your own school?
Do you like to compete? If yes, who do you like to compete against? Why do you like to compete?
If you win, what do you win?
What would be a good and fun thing to win in a game?
Do you have any suggestions on what would be a good reward to the people that did not win?

Environment:
If I say environment, what does it make you think about? Recycling, eco-friendliness?
Do you usually talk about the environment? What do you talk about then?
Have you had any games or competitions in school that are about the environment?
Have you ever played a computer game that is about the environment?
Do you think that that would be a good thing to do in school?
The Quizzes

Day one.
1. Du är i en affär och blir sugen att köpa något att äta. Du köper:
   1. En påse Kex choklad där varje Kex ligger i sin egen plastförpackning.
   X. Några bananer i en plastförpackning.
2. Ett äpple

2. Du ska gå med familjen och handla mat. Innan du går hemifrån:
   1. Tar du med dig plastpåsar hemifrån.
   X. Hoppar du runt och skriker att du vill köpa glass.
   2. Skickar du sms till din kompis.

3. En av dina leksaker går sönder. Du...
   1. Slänger den.
   X. Köper en ny.
   2. Ber någon att laga den åt dig.

4. Din småsyskon fyller snart år. Du vet inte vad du ska ge honom/ henne i present.
   1. Du köper något åt honom/ henne från en butik i stan.
   X. Du ger honom/ henne en av dina gamla grejer.
   2. Han/hon får ingen present från dig.

5. Du har tröttnat på alla dina tv-spel. Du...
   X. Slänger allihop.
   2. Går till biblioteket och lånar ett nytt spel.

Day two.
1. Sopsorterar ni hemma?
   1. Ja
   X. Nej
   2. Vet ej

2. Vad är bra för miljön?
   1. Köpa mat från en bonde i Sverige
   X. Slänga papper på marken
   2. Flyga flygplan

3. Hur tar man sig miljövänligast till skolan?
   1. Bil
   X. Cykel
   2. Taxi

4. Om du ska köpa kläder, var är det mest miljövänligt att gå där?
   1. JC
   X. H&M
   2. Second hand butik (Myrorna, Humana, Emaus)

5. Släcker du lampan när du lämnar ett rum?
   1. Alltid
   X. Aldrig
   2. Ibland
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