SUPPORTING ELECTRACY IN CHILDREN THROUGH STORYTELLING:

Design for children's new roles as collaborative players and media producers in a public setting

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“The most dangerous phrase in the language is,
“We’ve always done it this way.””

- Grace Hopper
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### INTRODUCTION

1.1 A new library for small children in Malmö
   - 1.1.1 Project brief
   - 1.1.2 Research Question
1.2 Previous experience
   - 1.2.1 Relevance of previous work
   - 1.2.2 Personal motivation
1.3 Collaboration with Unsworn Industries

### METHOD

2.1 Field studies
2.2 Design methods

### THEORY

3.1 Research framework
3.2 Electracy
   - 3.2.1 Definition
   - 3.2.2 Changes in institutional structure and children’s roles
   - 3.2.3 Changes in communication
   - 3.2.4 Sharing
   - 3.2.5 Risks in an electrate world
3.3 Children’s learning abilities
   - 3.3.1 Adults, children and technology
3.4 Play
   - 3.4.1 Overview
   - 3.4.2 Open-Ended Play
   - 3.4.3 Adventure Playgrounds
   - 3.4.4 Engaging children in Play
   - 3.4.5 Storytelling

### EXISTING PROJECTS

4.1 The Interactive Children’s Library at Aarhus
4.2 The Pogo Project
4.3 Rope Revolution
4.4 Phone apps to make a collage with different images

### DESIGN PROCESS

5.1 Malmö City Library
   - 5.1.1 First meeting and challenges
   - 5.1.2 Lilla Slottet
5.2 First homework and workshop with the library staff
5.3 Survey for parents
5.4 First concepts
   - 5.4.1 Control remote objects
   - 5.4.2 Design your own interface
   - 5.4.3 Technology adventure playground
   - 5.4.4 Little researchers adventure
5.5 Second homework and workshop with the library staff
5.6 User testing
   - 5.6.1 Design experiments at the library
   - 5.6.2 Workshop with children
1. INTRODUCTION

1.1 A New Library for Small Children in Malmö

1.1.1 Project Brief

Children are a priority group for Malmö City Library. In June 2012, a new space for children between 9 and 12 years old was inaugurated. Now, the library aims to redesign their space for small children, from 0 to 8 years old for 2015. The goal of the project is to provide all children in Malmö better reading, learning and play possibilities through physical, digital and social spaces. The new space will be called “Lilla Slottet”, which is Swedish for “The Little Castle”. The library staff wishes to emphasize creativity and innovation through a free and open perspective. They want to establish new creative, intelligent and innovative activities for children with a main focus on collaboration with parents and other children.

Since the beginning of the project last September, the library has developed studies and surveys to gain a general knowledge of the people who attend the library regularly. There are also 2 other students doing their master’s thesis with this project. They study Child Culture Design at HDK in the University of Gothenburg, and focus more on the general redesign of the space. The current stage of the project is developing concepts, based on the research developed so far.

For this purpose, the library has hired the interaction design and innovation studio Unsworn Industries, and I have joined the project to conduct my research and contribute with concepts for the future of the children’s library in Malmö.

After the 10 weeks of this project, a meeting will take place where chosen design concepts will be presented. The city will decide based on interest, budget and realistic possibilities, which of the concepts will go forward and the building of the new Lilla Slottet will begin after the summer of 2014.

1.1.2 Research Question

In the beginning of this thesis, I had two broader research questions. The first question was: How should libraries, academic institutions and educational methods change in order to adapt to new technologies for small children, enabling them to become not just literate but also electrate?

This question was based on Ulmer’s theory of electracy. This term is used to include all new literacies that are connected to the digital, visual and technological world. For me, being electrate means having the necessary skills to read, understand, interpret and produce visual and digital information through the use of digital tools. An electrate child is one who has the ability make decisions on his or her own, while collaborating with other children in a play environment. The theory of electracy also implies that institutions are changing to adapt to the new electracy (Ulmer, 2002). This first question aimed to understand how Malmö City Library should adapt according to this theory.

The second question was: What kind of language-independent play can stimulate the brain to learn better how to use technology at this young age, without the use of screens?

There were many reasons to seek for a language-independent play. One of the reasons is the age group for the new Lilla Slottet, since Swedish children start reading at the age of 7. In Sweden, it is compulsory to attend school between the ages of 7 to 16, although most children now attend non-compulsory pre-school at the age of 6 (The Economist Intelligence Unit, 2008). It would be unproductive to have language-based interactions for children below the age of 8.
Another reason for this approach is that one of the main challenges of this project is to attract people from different backgrounds to the library, including recent immigrants who do not speak Swedish. Having a language-independent play would help immigrant children and parents take part in the activities and interact with Swedish speaking families.

Visual interactions are a main aspect of a digital library. Visual literacy refers to all cognitive abilities related to dealing with visual representations, including constructing, representing, and communicating knowledge through images (Billie, 2012). Visual literacy is a critical skill for children in today’s increasingly visual digital and analog worlds. This is the third reason to explore a language independent approach.

As the thesis project developed and as I read, talked to the parties involved and started having workshops, I decided to redefine my approach. I took a special interest in children producing and sharing media. As children’s roles change due to today’s digital culture, these are becoming important new skills for them (Erstad, 2003). Instead of removing screens, I decided to explore children’s collaborative creativity with a combination of digital and analogue tools for the library setting. However, these first 2 questions remained an important factor in shaping the initial direction of my research and my interests for this project, such as language-independent play and electracy. Some of the design decisions were still made taking into account these original questions. In part 5 of this thesis, I will talk about the design process and the events and theoretical findings that led me to reshape my question. My final research question is the following:

How can Malmö City Library help children between 5 and 8 years old become electrate, with a focus on collaborative play and media production skills development, through a combination of digital and analogue tools?

1.2 Previous experience

In the past, I have had the opportunity to work and design with children. I participated in 3 different projects aimed at familiarizing children from ethnic minorities and high-risk family backgrounds with art and design. I also worked with children from an interaction design perspective for a class during my current studies. I will explain these projects briefly.

In 2009, I worked with children between 3 and 12 years old, at a Mexican Government Shelter for Children in Querétaro, Mexico, called Caminando Juntos. Puppets, masks, and set design were created with the children for theater plays from children’s popular short stories.

In the beginning of 2011, I did creative work with children at orphanages for the AIESEC KIDS Project in Warsaw, Poland, where we created character designs together from recycled materials such as paper or eggs.

For the third project, called Aktiv Sommer, I did creative work with children in Trondheim, Norway. We worked with children from asylum seeker families and local children from different backgrounds, building activities to help their integration process. I was responsible for activities with the children for the Arts department. We built puppets and a castle for a story that the children created themselves. We also built figures from reused plastic materials that were borrowed to us from the REMIDA center, where they collect industrial waste and organize creative workshops with local children. All activities intended to stimulate the children’s creativity and social skills.

These 3 projects had in common the development of characters for different purposes and made of different materials. Whether to reenact existing stories are plays, create their own or simply explore a materials, these activities gave me an insight about how children put different parts together, from the environment and their imaginations, to develop characters and stories with incredibly creative elements.

During my current studies, I had a class about collaborative media. For this class, my team developed an installation for children attending the “Nallelkonsert”, Swedish for “Teddy Bear Concerts”, offered by the Malmö Symphony Orchestra.
These are classical music concerts for children between 4 to 6 years old. Children should bring their stuffed animals to interact with Nalle, a teddy bear who tells a story on stage accompanied by the orchestra.

We built an interactive and collaborative music experience to be used before and after the concerts at the foyer where children and their families wait to enter the concert. For this project, we had 2 participatory design workshops with 6 and 7 year-old children at a preschool in Malmö. The result was a musical installation that consisted of seven different hoops. Each represented a group of instruments from the orchestra (percussion, woodwinds, etc.). Each hoop had blinking LED lights and an ultrasound sensor. When the children threw their stuffed animals through a hoop, the music of that particular instrument would start playing a short fragment of 5 seconds and the LEDs would light up. By working together, children could make the whole orchestra play at once or experiment the sound of a single instrument or different combinations of them. When we tested this installation, it was particularly interesting to observe how children built their own rules and games as they threw their teddy bears through our musical hoops.

1.2.1 Relevance of previous work

Some elements from these previous experiences were especially helpful when planning the workshops and developing concepts for this thesis, in particular the Nalle Music Hoops. I will explain more about this throughout my thesis. Other experiences helped me as a starting point to understand children’s storytelling capacities and imaginative skills for developing characters and other items to create their own stories and to know that it is possible to create different items on different days for one same story to keep children engaged throughout long periods of time.

An important past learning that came from these projects, except from the one in Mexico, is that I had to face a language barrier with the children involved. These experiences have helped me find new ways of understanding and communicating with children. It is relevant to mention, that I currently study Swedish. However, speaking with children requires a higher level of language skills than I currently have. And although I had help with the language from the library staff and from one of my teachers at Malmö University, these previous experiences helped me during the workshop I organized with Swedish children.

1.2.2 Personal Motivation

My personal experience with libraries growing up was not always a positive one. I come from Mexico, where the idea of a library is different than in Sweden. In the school that I attended, the library was used almost exclusively for punishments. When a student had done something wrong, he or she had to spend a few hours or even the whole day at the library. The task was to pick any random book and copy the text from it onto a notebook with handwriting. This anti-didactic method contradicted love for libraries. In addition to this, by going to the library for any other purpose, any student would have been considered a geek or a nerd. The library was a place to be avoided.

However, the first time I used the Internet was at a library in Canada in the mid 90’s when I was 10 years old. My brother and I used the computers there to find information about our favorite music artists on Yahoo¹. I remember the excitement we felt later when we got Internet for the first time at home, approximately one year later, meaning that this tool that we first encountered at a library, was now available in our living room.

My hope for this project is that all children in Malmö will have the same opportunities to come to the library and grow up loving the place. I dream that these children will have the same opportunity that I had to discover new technologies for

¹ https://www.yahoo.com
the first time at a library and that this memory will have a positive impact in their perception of the meaning of libraries in the future. Libraries and educational institutions are changing and finding ways to adapt to new technologies and media. Through this research, I attempt to contribute to this adaptation and to build new digital possibilities for children and parents to interact at Malmö City Library, increasing the number of families that love the library and attend regularly. I also hope that the concepts developed from this research’s knowledge contribution will be implemented in reality when the new space is built.

1.3 Collaboration with Unsworn Industries

For this project, I had the opportunity to work together with Unsworn Industries. They were hired by the library at the same time that I joined the project to develop design concepts for the new Lilla Slottet. The decisions about the method I followed were based on the plan that they determined.

Unsworn Industries and I decided to collaborate together in the ideation and execution of workshops. I received a lot of guidance, feedback and support from them. Many of my most relevant learning outcomes came from my time planning and discussing the process with them. Throughout this thesis, I will explain this collaboration more extensively. However, I will only mention the aspects of Unsworn’s process that were relevant for my research question and had an impact on my design process. I will refer to the team of designers that I was lucky to work with during my process as Unsworn. The team included Livia Sunesson, Sveta Suvorina, Helga Steppan and Magnus Torstensson.

Image 1: From left to right: Helga Steppan, me, Livia Sunesson and Sveta Suvorina wearing iPhone and iPad costumes
2. METHOD

2.1 Field studies

The first step for this project was a meeting with Karin Johansson, project leader from the library staff. I asked her questions about the direction of the project, based on the brief. We also discussed my involvement in the process. The next step was a kick-off meeting, held between Unsworn Industries, the members of the Lilla Slottet team from the library staff, the two students from the University of Gothenburg and me. During the meeting, all the challenges for the project were presented and discussed. In this thesis, I will refer to the team from the library staff as the librarians.

In the beginning, Unsworn and I did an observation of the current space at the library for children from 0 to 8 years old, as well as the recently redesigned space for children from 9 to 12. I had talks with different members of the library staff and from Unsworn to understand their approach, interests, concerns and dreams for this project.

Unsworn, the librarians and I joined a Pinterest and a Facebook group, where everyone could share ideas, images and information about related projects useful for our process. In addition to this, I conducted further research about existing libraries and interaction design projects for children. I also read academic papers about different theoretical aspects that I selected as relevant for my research question, which changed as my research question evolved. I later developed a survey for parents in Sweden to gather information about parents’ fears regarding children and technology.

Towards the end of the project, I discussed it with Marie Ehrndal, Interaction Design teacher at K3 with experience in game design, and I met with Åsa Harvard, a researcher in the fields of design and cognitive science with an interest in children’s learning and peer collaboration. I received feedback from both of them for my project.

As mentioned in the introduction, many of the decisions regarding the method for my project were based on the process and timeline determined by Unsworn. Their process and mine were similar in many ways, but differed in many others. Unsworn’s final goal is to help the librarians develop realistic concepts, which will be used to implement digital tools in the Lilla Slottet. My main goal is to produce a knowledge contribution about young children’s electrate education through visual research and collaboration, using digital and analogue tools. The different aspects on which Unsworn and I focused are represented with stars in Image 2. The stars and their colors are based on Unsworn’s process (Image 3) and mine (Image 4). In this diagram, Unsworn’s stars are left without text to represent that their interests were not defined by them, but instead followed the results from a participatory process with the librarians. Although their process was interesting for me and I shared parts of their steps, we had a different timeframe and deadline for this project. This made it impossible for me to share their focus. In a similar manner, Unsworn did not have an interest in the theoretical aspects of my research. However, we shared an interest in the challenges on which I chose to focus for my research, and on developing concepts, even though the actual concepts and the methods used to reach them were different.

![Image 2: Collaboration between Unsworn and me. Image based on a sketch by Livia Sunesson](image-url)
2.2 Design methods

Since the beginning of the project, Unsworn planned a series of homework and participatory design workshops with the library staff. The first workshop focused on strategy and the second on concrete problems. There will be a third workshop focused on idea generation after the completion of this thesis. When designing for children, it is important to also include the adults who will be involved in the design. The librarians working on this project are very open-minded and with real interest in innovation and in creating the best possible experience for all children in Malmö. They are experts in the library setting and they are full with ideas. Unsworn’s job is to provide the librarians with a creative participatory process to help them understand their own challenges, possibilities and dreams to turn them into real, concrete ideas.

Personally, I had a great learning outcome from the time I spent with Unsworn. One main challenge in my thesis however, was the difference in the timeframe for the project, since it was necessary for my process to have a concept in a stage where they were still dealing with concrete problems before ideation. Nevertheless, the first two workshops helped me analyze and reshape my concept proposals by learning more about the challenges for the project from the librarians’ perspectives. In the last week of the project, I had a meeting with the library staff to evaluate my concept. However, time limitations for the completion of this thesis meant that it was not possible to do user testing of my concept from the side of the librarians without interfering with Unsworn’s creative process. Unsworn’s process is explained in Image 3.

Image 3: Unsworn’s creative process plan. Image made by Unsworn

Initial observations and Homework 1 led to Workshop 1. The results gathered then, led to Homework 2 and round of experiments and prototype testing 1. These results led to Workshop 2. This is where the project is at the moments and these are the steps in which I have been able to collaborate with Unsworn during my process. The homework and workshops were planned by them. However, I had one activity in each of the workshops. One big challenge for me was to find a way to gather ideas in the workshop focused on strategy and to test my concept in the workshop focused on concrete problems. My concept had its roots on my own research, rather than on this participatory process. However, the first 2 workshops helped me to incorporate the librarians’ experiences to my concepts and to understand participatory design from a practical perspective by observing how Unsworn helped the librarians develop their own concepts.

In the beginning of the project, I also planned to have participatory design workshops with children. Participatory design (PD) workshops acknowledge the importance of concepts being user-friendly and user-centered (Eriksen, 2012). PD actively involves users and stakeholders in the innovation process for product development (Brandt, 2006). This is considered crucial in today’s design research (Eriksen, 2012). For me, participatory design means giving the users tasks that focus on the challenges they wish to solve in a fun, creative and unobvious way. These tasks should be planned carefully to avoid leading the users to agree with the designers’ speculations. Through a participatory design workshop, designers can provoke idea generation to combine the users’ and designer’s expertise and develop concepts together.

When designing for children, it often that adults make the decisions about what they believe children want or need, without involving them in the process. Children have been increasingly used as design testers, partners, informants or using the BRIDGE method. This method is a socio-cultural based approach to children computer interaction (CCI), where
children are involved as authentic stakeholders (Iversen & Brodersen, 2007). Participatory design and the involvement of children as partners, informants or stakeholders are fruitful methods because children are honest design partners. They will tell honestly if a concept is fun or boring for them (Druin, 1996). Unfortunately, having participatory design workshops with children was not possible, due to time limitations and difficulties to get a local preschool to arrange time for this activity. However, testing concepts with children is a crucial step. Exploring a design through an experimentation workshop based on a concept helps designers gain new insights and understandings about where a design should head in the future (Brandt, 2006). Towards the end of the project, I had a workshop with children as testers at the library during which I tested one of my concepts. The results from this experimentation led to my final concept.

In order to better explain how Unsworn’s process and mine met and differed in different moments, I created an image to illustrate the process I followed, based on theirs (Image 3). The purpose of this diagram is also to explain which methods led to others and to the concepts. There are only 7 parts of Unsworn’s process during which I collaborated with them and they are included in my diagram in the same colors as in theirs. The elements in orange are the methods I conducted without Unsworn. I divided this diagram into 6 steps. However, my research on academic papers and existing similar projects continued throughout most of my process as I defined my final research question and concept.

![Image 4: My creative process plan, based on Unsworn’s diagram (Image 3)](image)

I started this project by reading academic papers relevant to my first 2 research questions. I had talks with the parties involved and attended the kick-off meeting held by Unsworn, where Homework 1 was given to the librarians. When we received the results, I analyzed them to have a same level of understanding of the project as Unsworn and the librarians.

During the first part of the process, Unsworn and I conducted the initial observation of the existing space for children.

In the second part of the process I attended and held one activity in first participatory design workshop for the librarians, which was planned by Unsworn based on the results from Homework 1. From the observations during this workshop, I decided to develop the online survey for parents and Unsworn created Homework 2. At the same time, I continued to do theoretical research as my research question evolved and I began reading about existing similar projects.

I analyzed the results of Homework 2 and incorporated them into the development of 4 initial concepts. This third step continued to shape my research question and led me to focus on narrower academic topics and existing similar projects.

The fourth part of the process included the talks with Harvard and Ehndal about my concepts. Unsworn conducted their first experiments at the library and I had one experiment to test one of my concepts. These experiments in combination with the results from Homework 2 led to the planning of Workshop 2. This workshop was mostly planned and executed by Unsworn. However, I also had one short activity during it. During the fifth part of the process, I evaluated the relevance of the 4 initial concepts for this project and my research question, and chose one to develop further. In order to test it, I organized a workshop with children and explained my idea to the members of the library staff. The feedback that I received, combined with existing similar projects closely connected to my idea, led to the last step of my process and the final concept. These steps are clearly explained in the Process section of this thesis.
3. THEORY

3.1 Research framework

For this thesis, I analyzed three main theoretical topics. In this section, I will discuss them, starting with the broader one. My research started with the term electracy. Former research about it includes new learning skills, but also changes in culture, society and institutions, as well as the educational implications that this brings to students, teachers and learning settings (Ulmer, 2002; Erstad, 2003; McGhee & Kozma, 2001). I mainly focus on suggested changes for students in the new electrate world and analyze how this translates to play and play environments for small children.

To narrow down my base concept of electracy, I conducted research regarding the learning abilities of children within my target age group. I also took an interest in the relationship between adults, children and technology. This includes discussing fears and risks that parents believe their children face with the development of new digital tools.

Most of the research I found about electracy focuses on school-aged children and their roles as students. In this theoretical frame, I translate that knowledge into the implications this brings for small children and how new roles are developing for them, as they discover the world through play. This led me to doing research on different aspects of play.

3.2 Electracy

3.2.1 Definition

With the recent development of technology, many new terms have been created to explain the new set of skills that people should acquire in order to be considered digitally competent. Being digitally competent means having the ability to operate technological applications and to use technology to accomplish personal needs (Erstad, 2003).

New types of literacies include digital literacy, media literacy, computer literacy, visual literacy, tool literacies and literacies of representation. Many other similar terms have been created, but for this thesis, I will explain the definition of these 6 new literacies.

Digital literacy is an extension of literacy that includes the skills to decipher images and sounds in addition to written language on a digital dimension (Lanham, 1995). It also refers to the cultural understanding of the use of digital and communication tools and the skills necessary to use them in educational and everyday situations (Buckingham, 2010).

Media literacy is the ability to access, experience, evaluate and produce media products (Petterson, 1997)

Original concepts of computer literacy included general knowledge about how to use a computer, computer history and policies regarding computer usage. As the use of computers evolved and their use became a ubiquitous part of everyday
life, the definition of computer literacies expanded to include knowledge about programming, Internet and social, as well as ethical aspects of computer use (Hoffman & Blake, 2003).

Visual literacy refers to all cognitive abilities related to dealing with visual representations, including constructing, representing, and communicating knowledge through images (Eilam, 2012). Tool literacies refer to having necessary skills to be able to use technology, while literacies of representation means knowing how to use the possibilities that different forms of representations give the users in relation to new information and communication technologies (Tyner, 1998 according to Erstad, 2003).

All these different forms of literacies relate to the use of new technologies. Electracy is a term that combines all these theories. It refers to skills in operating technology and the ability to use technology to gather and reflect on the use of information for different purposes (Erstad, 2003). My definition of electracy is the set of skills that enable a person to read, produce and edit information through technology, as well as the ability to adapt as technological tools advance, taking into account the social, cultural, educational and institutional structure changes that acquiring such skills implies. The theory of electracy was developed by Gregory Ulmer. He saw the need for a new term and explained why all the new types of literacies cannot be called literacy anymore. Ulmer states that electracy is to digital media what literacy is to print (Ulmer, 2002). It would sound absurd for us to speak of written orality. We clearly know the difference between written and spoken language. Orality refers to the ability to communicate with spoken language, while literacy refers to the ability to read and write, and to have the capacity to understand and analyze what we read and to be able to produce coherent written text. The word electracy suggests that speaking of digital literacy is a term as absurd as talking about written orality. However, throughout this thesis, I will refer to the separate skills of electracy as literacies, such as visual literacy, in lack of a better term.

I chose to write about Ulmer’s theory because I agree that it helps create a new perspective for the world we are facing thanks to technology, rather than adapting the word literacy to it. We have acquired new ways of understanding and producing information. The term electracy makes it more obvious that we are entering a new dimension of knowledge and information.

There are 4 important implications about the way the world is changing for children’s learning experiences in relation to technology. The first one is the increase and availability of computers and technological tools. The second is the new communication tools that are used for both formal and informal uses. The third implication is the access of information thanks to the Internet. And the fourth is the possibility of being able to produce knowledge for children, instead of only being consumers (Erstad, 2003).

### 3.2.2 Changes in institutional structure and children’s roles

In addition to being a new term to explain this new understanding of the world, electracy goes beyond simply being a definition. It also takes into account how society, culture and institutions are being affected by technology and how it is important to take a new look and redefine aspects of our daily lives.

Technology changes incredibly fast, affecting social, cultural, educational, business and many other aspects of modern life. However, educational systems have changed very slowly. Old-fashioned and traditional ways are still being used in educational institutions. Devices and other digital tools are still often viewed as something external that is not included in the teaching process in formal institutions of knowledge. Electracy is something that young people develop naturally by growing up in today’s digital culture. Technological learning should not be something opposing school, but something
that empowers children to gain formal and informal learning. Empowerment is defined by the use of cultural tools situated within cultural practices (Erstad, 2003).

Ulmer explains how the world is going through a change similar as when orality changed to literacy. New institutions and forms of education are being developed, and those existent for literacy will no longer be sufficient in the near future (Ulmer, 2002).

Through technology, it has become possible for institutions, such as libraries and schools to offer children a wider array of possibilities to explore the world. Institutions can support children in becoming electrate by offering them new motivating and challenging activities that combine the use of digital and analogue tools, increasing also their oral and literate skills. The use of digital tools that provide a proper approach to technology that is fun and engaging stimulates creativity and learning abilities. New technologies that were not previously available for educational practices can empower young people in formal learning activities. However, when such new technological tools are introduced in formal institutions of knowledge, it is also necessary to change internal processes. Power structures in institutions and educational systems must be changed (Erstad, 2003).

Ola Erstad conducted a study in Norwegian schools about learning empowerment through electracity with children studying between 8th and 10th grade. The context for this thesis is children from 4 to 8 years old in Sweden. However, I find his study interesting and I believe that a lot of his findings can be transformed into play empowerment for small children. Nordic countries have adopted new technologies to a greater extent than other societies and access to these technologies is very high among young people (Erstad, 2003). Erstad found that all the children he interviewed thought that school is monotonous and boring. Children need motivation for proper learning. One main problem with educational systems is that children lack stimulation and meaningful challenges, making children bored and uninterested in learning (Erstad, 2003).

There are 3 new roles for students in an electrate learning environment (McGhee & Kozma, 2001). I believe these roles can also be implemented for small children in play environments based on Piaget’s theories of how small children think and learn, regarding social, emotional and intellectual development. Piaget’s studies placed children in the center of their own learning and analyzed how children learn through an ongoing interaction with the environment, objects and people who surround them (Halpenny, 2013). In this research, I will explain how I believe these roles can be applied for play. The first role is that children must be self-learners, being able to select what they want to learn and to identify real life problems and find solutions for them (McGhee & Kozma, 2001). Electracy also empowers children to decide about how and why they want to learn, this creates engagement and better learning results. Learning environments must change to adapt to this transition from instructed learning to self-learning, both in real-life and virtual settings (McGhee & Kozma, 2001). Electracy means that children have real power to decide about their own education by taking advantage of new cultural tools that digital technologies allow (Erstad, 2003). In play, this role turns into the role of the self-player, meaning that the child should be able to decide which games to play, as well as how and when to play them. He or she should be able to contribute to the rules of the game and shape play according to his or her needs and setting. Children should be able to exercise their creativity in the way they play. The transition should be from instructed and predefined games to ones that allow the child to explore on his or her own, through approaches like open-ended play, which is later explored in this thesis. New changes imply that it is the children themselves who will decide how they learn and play, while adults only offer guidance, based on their individual needs, instead of instruction (Erstad, 2003). As my research developed, I discovered that small children still require a starting guidance and inputs from which they can build on and exercise their creativity to become self-learners as they grow. However, I believe play environments will
become more child-centered, taking into account that different children have different needs and interests, and allowing them to play and learn according to them, while socializing with other children with other skills and interests.

The second role is that children must be able to work as team members (McGhee & Kozma, 2001). In a play setting, this means playing in collaboration. According to Piaget, small children have an egocentric thinking in social development during early stages of cognitive development, making it difficult for them to collaborate. However, between the ages of 3 to 4, children are already able to understand the perspectives of others (Halpenny, 2013). As children grow, peer collaboration becomes a crucial part of learning. Many studies show that children who learn in collaboration learn better than those who learn alone (Teasley, 1997; Fawcett & Garton, 2005; Damon, 1984). Learning since a young age to share and play together and socialize with other children and adults can help children become good team-workers in the future. Finally, the third role is being able to act as knowledge managers. This means formulating questions, searching for information, collecting and analyzing data and designing reports and presentations using digital tools (McGhee & Kozma, 2001). Being a knowledge manager is closely connected to the use of technology and it is very important, as it makes it possible for children to be the authors of their own multimedia experiences (Druin, 1996). Semiotic competence is a key learning for today’s children. This means having the ability to give shape and handle multimodal expressions as part of everyday collaboration, communication and participation (Drotner, 2011). Media production in children is a necessary skill that will aid them in developing this competence.

For this thesis, I wish to explore how the second and third roles can be part of play in the library, helping children become electrate from a young age. This idea was later reinforced by the findings in the participatory design workshops with the library staff, leading me to turn this into a core concept in my research and to include it in my research question.

3.2.3 Changes in communication

Communication tools are another important factor in the world of electracy. The Internet is changing the conditions and possibilities of learning and communicating (Dunkels, 2007). The use of communication apps for smartphones has increased rapidly in the past few years with the expansion of ubiquitous Internet access. This is changing how we communicate with others, how we occupy our time and how we make and change plans. New communication tools are changing the way we use language.

The use of language relates to how we think and how we use concepts to communicate and create meaning (Erstad, 2003). With instant messaging apps and the increased uses of social media, we are becoming used to communicating with a digital mixture of written language and images. The use of emojis, stickers and memes shape our conversations and the way in which we express feelings and emotion (Tossell et al., 2012).

The way in which we formulate written language is different to that of spoken language. Writing styles were developed as one of the many aspects that were introduced to culture as the world changed from oral to literate. In the same way, the process through which we formulate language nowadays is becoming highly visual as the world becomes electracy. Learning to interpret visual language, in addition to spoken and written ones, is a crucial skill for children to fully take advantage of new digital tools. Children embrace technology a lot faster than adults. This has opened up new opportunities for self-expression, learning and community (Whitebread & Bingham, 2013).

Online social networks also change the way we communicate, in the way they allow public conversations amongst multiple persons and new possibilities of expression for shy children (Coplan and Armer, 2005 according to Whitebread & Bingham, 2013). Through social media, young people are able to share their thoughts, feelings, findings and creations publicly in just one click and to receive multiple answers. Media and new technologies play an increasing role in the lives
of young people and children, and in the way they communicate and share information. Erstad states that communication shapes society because humans construct meaning together and in relation to each other (2003). These new forms of communication are mainly visual and done through screens. However, there are theories that sustain that screens will disappear in the future (Michelis et al., 2006). These theories explore different senses that could be used to control computers to integrate them to humans in truly embodied ways. Device interaction experiences could become more instinctive, natural and social without a screen, allowing a broader use of human sensory capacities, through gestures, language, sounds and body language. Suggestions include interfaces through RFID-technology that uses radio frequency waves, audible interfaces, imaginary interfaces or tangible interfaces (Michelis et al., 2006; Marco et al., 2009; Gustafson, 2012). These alternatives offer possibilities to socialize, be physically active and receive instant feedback (Marco et al., 2009).

By the use of screen-less interactions, we sacrifice visual feedback. As I was able to test during the PD workshops for the Nalle Music Hoops, immediate feedback is crucial when working with children. And although hearing feedback and audio production could also be a possible approach to deal with new roles of electracy, I believe that for the setting of the library for small children, visual literacy is a more interesting approach to experiment with. Even though there are many risks that might be connected to the use of screens, I do not believe that the use of screen-less devices, while sacrificing visual feedback are a solution to help small children become electrate. This was another motivation to rephrase my research question. However, the concept of tangible interfaces is still relevant for my final concept.

3.2.4 Sharing
Youth is the first group in society that uses technology in social practice. Children have a basic role in the diffusion of innovations in society (Erstad, 2003). This is made possible in a broader way now thanks to social media and immediate possibilities of knowledge sharing. Sharing is one of the most important advantages that new digital tools provide. New technologies are shaping everything; from the way children play sports to the way they learn in a classroom (Wertsch, 1997 according to Erstad, 2003). But they are mainly changing how we share these experiences.

As children make use of innovations and learn to produce their own media, they also learn to share their creations. Active use of digital tools includes the ability of sharing knowledge. It has become common as well to create knowledge about creating something and sharing it. One example of this is Do It Yourself (DIY) videos on YouTube.

It is important that formal institutions of knowledge incorporate new communication structures in the way they reach youth and that sharing knowledge is encouraged amongst children, acknowledging the 3 new roles for students.

3.2.5 Risks in an electrate world
In spite of all the advantages that this theory can offer, electracy also has the risk of creating a new social division between those who know how to operate technology and use it to gain and produce relevant knowledge and those who don’t (Erstad, 2003). New tests exams have to be developed to test levels of electracy. It is important to measure not only the ability to use a tool but also the ability to interpret information and use it in reality. The PISA exam, for example, does not test only the ability to read and write. It also tests the ability to understand what is written and use it to solve real life problems (OECD-PISA).

With the world changing and as a new set of skills becomes necessary for children today, a new way of analphabetism is also being created. People who are better electrate already have better opportunities. This will increase when today’s children are adults. Children should be encouraged that it is ok to have different interests and goals to reach. Some
children might not be interested as adults in working in sectors that require high technological skills and abilities. However, teaching children to become electrate will provide them with equal opportunities as adults, regardless of their interests. One would not suggest not teaching a child to write in elementary schools because they might not want to become writers as adults. I compare the use of digital tools with writing because it is more obvious for us that learning to write will give children a crucial skill for their lives. In addition, children with little access to digital tools have to rely on the education system (Dunkels, 2007). This strengthens the importance for formal institutions of knowledge to incorporate teaching about eletcrracy to provide adequate learning experiences for children. Knowing how to use technological tools has already become a crucial subject for children, whether they choose a technologically based carrier path in the future or not. Technological tools are used in our daily lives for both personal and professional purposes in increasing levels. This subject should be taken with the same importance as literature.

Furthermore, learning any skill at a young age can help children develop early interests that they can explore freely through play. This also affects libraries and spaces for small children, who do not attend school yet.

### 3.3 Children’s learning abilities

Children are natural curious explorers. As we grow, our experiences and knowledge of the world become larger. Adults play a basic role in the learning process in the way they allow or restrict children to explore and understand the world. This helps children develop metacognitive skills. Metacognition is the awareness and ability to control own cognitive activity (Whitebread & Bingham, 2013). Cognitive development refers to the changes and growth in thinking processes, such as memory, problem solving, and reasoning (Halpenny, 2012, p.11). Human potential for learning is extraordinary, especially when we are children. The memories and learning experiences that we have are crucial in mental and psychological developments.

There are different types of learning. For this thesis, I will only explain some of them. Children can learn through imitation. They observe how others behave, express themselves and connect emotionally and they are later able to reproduce this learning unconsciously. Children observe the interactions between people with other people, objects and spaces in daily life. Children attempt to make sense of everything they see to make cause-effect explanations (Whitebread & Bingham, 2013).

Another way of learning is statistical or inductive learning, a process by which patterns and regularities in the stream of experience are identified. Visual and auditory systems are developed through inductive learning (Kirkham et al., 2002 according to Whitebread & Bingham, 2013). As children learn, they create categories and patterns and add new experiences to them (Whitebread & Bingham, 2013). This explains why learning from experience is always more powerful than learning from instruction. Children experience a process or idea rather than just being told about it (Whitebread & Bingham, 2013). Inductive learning can be stimulated through social interactions, which are a crucial part of a child’s development. Learning to categorize and create patterns allows symbolic representation, which is a main skill for becoming learning visual literate. This is also the way in which children are able to imagine objects and events, which is crucial for creative play (Whitebread & Bingham, 2013).

Many cognitive and metacognitive processes emerge within young children before the age of 7, allowing them to learn in the way in which traditional education systems work (Whitebread & Bingham, 2013). This explains why children before this age should learn only through experience and in playful contexts. This playful learning should be in collaboration with other children and interacting with adults, as they do in the Swedish school system.
Theories and that they work as a guide while discovering technology and children. I (Druin, 1996).

Like having control to decide how to play. When given this freedom, they have the ability to stay engaged for a long time.

Children do not like being told what to do by adults or being asked to repeat the same tasks many times. Instead, they like having control to decide how to play. When given this freedom, they have the ability to stay engaged for a long time (Druin, 1996).

This suggests a difference in perception and usage abilities between parents and children, which goes beyond age difference, and is not currently supported by traditional education systems (Dunkels, 2007). However, this technological gap between children and adults can be bridged, by adapting educational institutions to electracy (Ulmer, 2002).

Children do not like being told what to do by adults or being asked to repeat the same tasks many times. Instead, they like having control to decide how to play. When given this freedom, they have the ability to stay engaged for a long time (Druin, 1996). There are many negative consequences that can come from a wrong approach of adults towards technology and children. It is crucial that parents as teachers still make important decisions based on pedagogical theories and that they work as a guide while discovering things together with children.

<table>
<thead>
<tr>
<th>Age</th>
<th>Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Knowing, learning, remembering</td>
</tr>
<tr>
<td>4</td>
<td>Holding auditory and visual information for long periods of time</td>
</tr>
<tr>
<td>5</td>
<td>Estimating, believing and predicting</td>
</tr>
<tr>
<td>6</td>
<td>Internalizing speech and transforming it to thought</td>
</tr>
<tr>
<td>7</td>
<td>Ability to perform and think in a self-regulated way</td>
</tr>
<tr>
<td></td>
<td>Turning material from categories and patterns into concepts, ideas and solutions to problems</td>
</tr>
</tbody>
</table>

Image 6: Skills children acquire between 3 and 7 years old (Whitebread & Bingham, 2013)

At the age of 7, children can control their actions, which is reflected in their behavior, motivations and even in the way they play. Children at this age learn self-control through thinking, remembering and problem solving. They develop the ability to differentiate the times of future events between the ages of 4 and 10 years (Whitebread & Bingham, 2013).

A child’s motivation and self-confidence are determining factors in his or her learning processes and development. Their emotional responses and level of interest to a particular activity determine the relevance of the learning outcomes and the amount of engagement time that the child can be expected to have during one same activity (Whitebread & Bingham, 2013). It is often said that children cannot do the same activity during long periods of time. However, during the Nalle Music Hoops project, we were able to record several children, between the ages of 4 to 7 that stayed playing with the hoops for up to one hour. Children’s attention span does not only depend on age, but on their personal motivation to participate in a particular activity. Children have an enormous capacity to do things that interest them (Druin, 1996).

Learning can also be categorized as natural, informal or collective. Natural learning refers to instinctive learning that does not always require practice. Informal learning is the one that takes place outside of the educational system. This type of learning is often viewed as a threat. Collective learning means learning in collaboration with others.

It is important for designers to understand different types of learning while designing concepts to increase children’s positive learning experiences. This research addresses children learning by imitation and inductive learning, as well as in an informal and collective setting. Children learn in an active way. Children love images that have something to say, with movement and variety (Druin, 1996). The learning that comes from actively exploring a place in contrast to hearing a description is immensely different at any age. But as kids, physical activity and exploration are stronger intrinsic desires.

3.3.1 Adults, children and technology

One challenge of electracy is the role of adults. There are 3 stages of technology. The first one is when a technology is first introduced to the world, the second is when it can be found in most homes and the third is when the new technology becomes part of everyday life. Children today are ‘digital natives’, because they are born into the third stage. In contrast, today’s parents were born in the first or second stage and therefore they are ‘digital immigrants’ (Dunkels, 2007).

This suggests a difference in perception and usage abilities between parents and children, which goes beyond age difference, and is not currently supported by traditional education systems (Dunkels, 2007). However, this technological gap between children and adults can be bridged, by adapting educational institutions to electracy (Ulmer, 2002).

Children do not like being told what to do by adults or being asked to repeat the same tasks many times. Instead, they like having control to decide how to play. When given this freedom, they have the ability stay engaged for a long time (Druin, 1996). There are many negative consequences that can come from a wrong approach of adults towards technology and children. It is crucial that parents as teachers still make important decisions based on pedagogical theories and that they work as a guide while discovering things together with children.
Regarding parents, Elza Dunkels conducted a research about children and the Internet. She encountered that children in Sweden are aware of possible risks, but that they view the Internet fearlessly and as an increase in opportunities. On the contrary, many parents showed fear and lack of understanding towards technology (Dunkels, 2007). Parents often overprotect children because of ungrounded fears (Rosin, 2014).

Regarding teachers, one problem is the belief that technology can do their job. On the contrary, technology, screens and devices should be an aid for the teachers to support effective learning and develop innovative teaching techniques. They should be used for pedagogical purposes and activities together with the teacher and to stimulate collaboration with other children, offering new socializing possibilities (Whitebread & Bingham, 2013). Technology should empower students to use new tools in a positive way, changing how they learn with help of the teachers, but without depending exclusively on them (Erstad, 2003).

There are several negative consequences that have been blamed on the use of screens. I divided the risks that I found into 2 categories: physical and social. Physical risks include bad posture and obesity, which can come from lack of physical activity and bad positions when sitting in front of a screen. Social risks include lack of social interactions and the risk of bullying and contact with harmful people, such as pedophiles.

I agree that the use of screens can be a factor for such consequences. However, there is no proof that use of screens and technology is an exclusive cause for them (Dunkels, 2007). Other factors such as parenting and the family environment that a child grows up in can be determining causes for negative results in tests about screen use for children. Many children have behavioral problems due to the inconsistent or lack of parents’ attention. Parents who lack to provide active listening, understanding and acknowledgement of a child’s feelings have increased probabilities of facing children with problems (Whitebread & Bingham, 2013). Further studies should be made, closely analyzing the relationship between parenting patterns and technology uses to be able to determine a real grounded statement about screens being negative for children.

At schools, negative results regarding the use of new technological tools are often due to the lack of competence among teachers and inadequate development of pedagogical issues concerning computer use. In response, children lack the opportunity children to take advantage of these new tools for their own learning (Erstad, 2003).

Enochsson states that teachers have a responsibility to learn about technology, which they can do in collaboration with the children (2001). Rosin states that the real change has to come from parents, regarding independence that will improve children’s creativity (2014). It is my belief that real cultural shift has to come from all adults, not only parents or teachers, but also librarians, and those with the power to make decisions about spaces for children. It is crucial that they all take interest in learning about new technological tools, learning to use them together with children. Parents, teachers, librarian, pedagogists, designers and anyone else working with/for children should aim to understand the digital world to be able to share it fearlessly with them (Whitebread & Bingham, 2013). The roles of adults have to change as technology transforms society and institutions of knowledge evolve. When the Lilla Slottet project is finalized, preschool teachers and parents should be encouraged to come to the library together with the children to take part in digital play in collaboration with the librarians. This is one of the main visions for my project.

This finding led me to redefine my first research question, where I attempted to find a screen-less approach to help children become electrate. It has been relevant during my research to be aware of the fears and lack of understanding that some adults face regarding technology. However, I believe it is more important to familiarize adults with technology than to forbid children from interacting with screens. Children will use technology, whether adults allow it and understand it or not. By forbidding the use of technological tools, we lose the chance to guide children to understand
media and become critical towards the new forms of information available. Pointless and counter-productive rules affect our possibilities to act as responsible adults. Many children know more about the use of digital tools than adults, but adults know more about the ethical, legal, pedagogical and human aspects that are involved (Dunkels, 2007). It is important that children and adults collaborate to learn together from each other with digital tools.

3.4 Play

3.4.1 Overview

Play is basic in children’s lives, it is the most important activity through which they learn and develop skills, as well as increase their understanding of the world (de Valk et al., 2013). As previously mentioned, when exploration and discoveries happen in a fun way, children remember them better and learn more from them than if being told by an adult what they think they should learn. Even as adults, our learning experiences are enhanced by fun activities in contrast to those we consider boring.

Play can be defined as an intrinsically motivated activity with no direct benefit or goal that is situated outside of daily life (Salen & Zimmerman, 2004). However, I find this definition inaccurate since a game can have a goal, both as an end to the game or in a bigger sense as a purpose in life, such as to entertain, learn or socialize. Another definition states that it is free movement within a more rigid structure (Salen & Zimmerman, 2004). There are many types of play. Spontaneous, free, structured, active, guided, risky, individual or collaborative are a few words to describe some of these types (de Valk et al., 2013). For this thesis I describe 4 aspects of play

3.4.2 Open-Ended Play

In open-ended play, children are given initial tools to start playing and constructing their own rules, games and meaning, without any strict steps to follow. In contrast to free play, where children make the decision of how, when and with what to play, open-ended play is initiated by adults. Open-ended play offers a starting point and context that children can manipulate to make their own through tools that work as a trigger for their imagination and creation. It should allow spontaneous, unstructured and improvisational play without a specific goal (de Valk et al., 2013). Through open-ended play, children are encouraged to improvise, play spontaneously, use their imaginations and develop their creativity, influenced by their everyday experiences and by the play setting.

The goal in open-ended play is to trigger the players’ creativity by leaving room for interpretation (de Valk et al., 2013). Many open-ended toys can be described as objects with mechanisms that activate a response through the use of sensors. These can have countless possibilities of number of elements, shapes, types of sensors and responses that create the rules for interacting. Number of elements can refer to the number of objects or tools that children can interact with, but it can also mean the number of interaction rules that correspond to the designed objects. If the number of interactions is too high, the game becomes more complicated and it will be more difficult for children to learn to use them and to create their own spontaneous responses (de Valk et al., 2013). A good design should be different enough that the children are attracted to it but simple enough that it is easy to understand and manipulate and then build their own rules around it.

Open-ended play commonly begins as a freer exploration activity, but as children invent their own rules, it often turns into a more structured game. It can move back and forth between the two types of games as children explore new possibilities and change the rules of their own games. It can also change when new children enter the game.
Game rules can be defined as mental concepts of which the understanding must be shared amongst the players (Gray, 2009 according to de Valk et al., 2013). When rules have been created, all children should know the rules of the game and all of them should know if a new rule has been added or modified to play in harmony. Game can be finite or infinite, depending on whether there is an end or a goal to it. In open-ended play, there is no established goal, but children are free to invent rules that allow a winner or an end to the game (de Valk et al., 2013).

Design for open-ended play can include toys, props and environments. In addition to this, there are several aspects that designers should consider when developing open-ended games. It is important to help create a balance between directing play and offering opportunities for players to shape and alter the game system, without dictating rules that will jeopardize the creativity and invention freedom that is intended with open-ended play. De Valk et al. write that the challenge for designers with open-ended play is to develop games that are specific and easy to understand but also general enough to encourage imagination and creativity in how to use them (2013).

It is also necessary to consider that children can be more dominant or shy, action-oriented or observation-oriented. In open-ended play, more dominant children often take leadership roles, being the ones who implement own rules that shyer and less dominant children follow. Designers should take this into account and think of ways in which all children can have ways of participating, avoiding the exclusion of less dominant children.

As de Valk et al. describe it, designing for open-ended play is a risk. The unpredictability of children’s reactions can make it exciting to see the kind of rules, or lack of them, that children invent with the designed starting point. De Valk et al. explain that designers should make clear decisions on what to design and what to leave open for players’ interpretations, having a balance between openness and complexity. They write that it is crucial to try the design concepts with users quickly and to do many tests frequently with them (de Valk et al., 2013).

When designing a game, it is the designers’ job to decide the possibilities the designed tools will allow for different game elements. De Valk et al. based on Fullerton explain the following 6 formal game elements that designers must decide on for open-ended play (Fullerton, 2004 according to de Valk et al., 2013).

- **Players**: One or multiple players
- **Rules**: The allowed actions that the tools include and how specific or free they will be
- **Procedures**: The method required for interaction
- **Modalities**: Feedback received when following the procedures
- **Communication**: How different elements of the game communicate and influence each other
- **Ownership**: Whether objects are personal or shared

Children learn the ability to understand a rule of interaction to carry out the action that triggers a response in a particular tool through inductive learning. Children who have acquired metacognitive skills and are able to reflect about what they have learned are able to take those rules of interactions and invent rules of play of their own (Whitebread & Bingham, 2013). When combined with social skills, children are then also able to teach these new set of rules to others and collaborate.

Going back to the term electracy, it is important to experiment and test how much freedom and collaboration can children manage and how much should there be external influences that guide and help them feel challenged, for their learning experiences to be as fruitful as possible as a method to help them become electrate (Erstad, 2003).
3.4.3 Adventure Playgrounds

Adventure playgrounds are inspired by junkyards. They might look like one and seem like total chaos with elements such as mud, piles of tires, places to start a fire, water bodies, and broken playground furniture, but they are carefully designed to provide children a challenging and risky, yet safe experience. Adventure playgrounds should have loose parts that children can move around and manipulate in a free and permissive atmosphere with as little adult supervision as possible. Trained adults supervise them but they do not interfere unless a truly dangerous situation requires it. Parents are suggested not to come at all (Rosin, 2014).

Adventure playgrounds started in the UK in the 1940’s after World War II, when there was a concern that children would have to face war as young adults and that they should be exposed to a certain level of risk since a young age, because shielding them from danger would not help them (Rosin, 2014). Today’s children are often overprotected, lacking spaces for independent exploration and creativity. Adults feel the need to instruct them, not giving them the freedom to take risks and dare fearlessly to make discoveries. Based on this preoccupation, new adventure playgrounds are being built.

The mission of these playgrounds is to make children face things that for them seem dangerous to be able to conquer their fears on their own, this way they are able to build self-confidence and courage. Children achieve independence by overcoming fears. This also diminishes the probabilities of them having phobias as adults (Rosin, 2014). Reasonable risks are essential for children’s healthy development.

It is important that we allow children to explore and that we trust them to be good judges of what they can and can’t do and to find solutions on their own to tricky situations. Adults’ task is not to forbid and instruct, but to guide them to reflect and be better judges to find solutions to problems.

Children have a natural need for sensation and risk. It is important to provide children with activities that allow them to have these sensations with enough guidance to ensure that they are safe but without overprotecting them. Adults tend to exaggerate dangers when observing children. Being able to discover something on their own is a thrilling experience for children, growing up is a process of managing fears and learning to make proper decisions to face them. The best way to learn this for children is to experience things themselves, not being told how they should act (Rosin, 2014).

I find it interesting to add a certain amount of chaos and risk to play in formal institutions of knowledge, giving them a place where they can explore without adults interfering. Children should be encouraged to explore and make mistakes in the physical and the digital world. This idea influenced directly one of my concepts.

3.4.4 Engaging children in Play

As previously mentioned, it is crucial for children to be motivated and to find activities challenging and meaningful to stay engaged and to produce fun and learning outcomes. Children that are constantly engaged in play activities are also less likely to be naughty and disrespectful towards other children (Rosin, 2014).

One key element that we discovered during workshops developed for the design of Nalle Music Hoops, is that children require instant feedback to know that their actions are affecting the designed tool. During one of the workshops we had to test our idea, we built 2 hoops out of a rubber hose and had a designer hold them up, while the children threw their teddy bears through them. We had a Bluetooth speaker connected to an iPad, which I controlled from the distance. If the child’s teddy went through one of the hoops, I would play a fragment of a song. However, the children were too fast and a few times, I missed playing a song at the exact moment. Children complained about not getting any music as a reward for having successfully thrown their teddy through one of the hoops.
We also tested different music game apps with them and we could observe that the most successful games that were able to keep the children's attention for longer periods of time, were those that were very easy to understand and that had immediate and very obvious feedback.

However, this workshop was conducted to design an installation, and something that would be used only for one time. In a previous workshop, we had decided that we wanted the learning curve for our installation to be fast, so that children could understand easily how to interact with the installation and would leave happily even after a short period of being there. The difference with the Lilla Slottet is that a design for this space should include a longer learning curve and activities that will keep children engaged enough to come back several times throughout the years, it should also be a design which can be adjusted and modified by the library staff to adapt to future needs that children can have in several years from now. Nonetheless, adding instant feedback still remains a key element when working with children.

Another important factor for engaging children in play is collaboration. Around the age of 4, children start referring to other children as their friends and establishing play relationships with them. In addition, collaborative play is important because it is how children learn concepts such as fairness and justice (Hemphill and Scheinholtz, 2009). Offering solutions that encourage children to make new friends with different children, in addition to coming together to the library with their friends to play, should be an attractive feature to engage children in play. These collaborations will also offer opportunities for spontaneous play.

3.4.5 Storytelling

Child’s play is often based on narrative, whether it is started by the children themselves or by an external source. Children take elements of the world surrounding them and of their previous experiences and integrate them to play. Today’s children are exposed to an increasing amount of media. The elements of the stories they hear and the images and videos they watch influence the stories they create during play. Narrative and stories are crucial in children’s development. For my thesis, I studied the possibility of stories being approached through a combination of physical and digital artifacts, while studying participatory design workshops conducted by Harvard & Løvind (2003).

Children develop stories based on the objects and materials available during play, combined with elements that belong only to their imaginary world. Harvard and Løvind explored how toys help the understanding of narrative. Different play tools can support children’s staging, enacting, retelling and modifying of stories. Similar to open-ended play, such tools should not be too complicated, simple structures that allow a certain amount of ‘do it yourself’ elements make it easier for children to develop their own (Harvard & Løvind 2003).

The new Lilla Slottet will be a space for children to have a first contact with many stories. Storytelling is one of the most popular current activities amongst children at Malmö City Library. One of the main goals of the library is to stimulate a library culture in children. The new design of the space should include a storytelling perspective.

Children’s first steps towards becoming literate are based on the stories they hear. Children learn better through stories and when they are engaged in a narrative. Children have always created their own stories. However, digital tools are expanding their possibilities to share them and become the storytellers from a young age. The stories and games that children create have changed thanks to multimedia computer environments (Druin, 1996).
4. EXISTING PROJECTS

There exists an overwhelming amount of interaction design projects for children. During my research, I came upon many interesting existing products that influenced some of my concepts. However, I chose only to explain in this section the ones that had a direct influence on my final concept. I encountered projects using 3 different methods: things that I found when I started with this research and was looking for inspiration, ideas posted by members of the library staff and Unsworth to the Pinterest and Facebook groups that were created for this project, and projects related specifically to my concept, which I found after the first draft had been created. In the conclusions I will explain how each of these concepts served as an inspiration for solutions to my final concept.

4.1 The Interactive Children’s Library at Aarhus

Aarhus public libraries worked on a research project focusing on children’s needs and cultural experiences, to suggest how the Children’s Library of the Future might look like (Frandsen, 2013). They prototyped different playful and interactive possibilities for children to become engaged in reading, learning and playing (The children’s Interactive library video, 2008). I will describe 3 of these prototypes that I find pertinent for my research.

The Story Surfer was an installation enabling children to gather information from library materials in a collaborative way by using their bodies and physical objects (The children’s Interactive library video, 2008).

Image 7: The Story Surfer

The second prototype was to test sound in the library. They tested different approaches to use sound as a playful and meaningful tool. I found particularly interesting one approach in which headphones could be shaped as different kinds of hat costumes, turning children into characters at the library (The children’s Interactive library video, 2008).

Image 8: Sound testing with headphone hats

The third one, called the BibPhone, is a tool that allows children to talk to books and listen to what others have previously told them. Its purpose was to offer an innovative and fun way to review, comment or hide secrets inside books through digital recordings by placing the BibPhone over an RFID tag. It was also suggested that these tags could be placed on walls at the library (The children’s Interactive library video, 2008).
The interactive Children’s Libraries at Aarhus is a relevant project because it aimed to explore new and unconventional ways to search and find books, as well as communicating with them and leaving a mark. It is also interesting that how they include sound and movement and how the third concept combines digital and analogue tools.

4.2 The Pogo Project

The Pogo Project by Phillips is a narrative activity model that explores 4 phases of storytelling: exploration, inspiration, production and sharing. Children communicate and express themselves through stories to understand their world. Phillips studied how children build stories, the kinds of stories that they build and how they learn from them. The result was this model that consists of tangible interaction tools with no instructions, making the process of finding out how it works part of the fun and the learning experience. There is a table with a screen where children insert a story card. A story card is a small object that works like a memory stick. Children can place any object over the screen and take a picture of it. They can later draw over the picture on the screen with their fingers. The story card records the pictures and children can take it to a mat on the floor with pockets on the corners to insert the story cards. They can create an animation with the pictures they took. Each story card that they insert becomes a new layer. These layers can be manipulated using a tangible interaction device, called a mumbo. The pictures react to the movement of this device, creating an animation. There is also a video camera for children to take videos and add them as another layer to the story. This project combines interaction design, electronic learning, collaboration and knowledge management (Phillips Design video, 2007).

Rope Revolution is a rope-based gaming system for collaborative play. For this project, a rope-based interface was developed to allow multiple games to be controlled through force feedback, potentiometer-based motion sensing
mechanisms and an accelerometer-based motion sensing. The developers of this project discovered that physical feedback is a key element for this interaction to be engaging (Linning et al., 2011).

Image 11: Testing Rope Revolution with children

This concept is pertinent for my research because it offers an alternative method to control something that happens on a screen in an active and instinctive way, while offering instant feedback, not only visually but also physically.

4.4 Phone apps to make a collage with different images

I tested 5 different apps that allow children to produce their own media in different ways and with different levels of freedom and possibilities. All these apps offer possible approaches of how my final concept could be solved.

Cut me in allows children to choose from a variety of backgrounds and insert a cutout from a photo they took. The cutting is done with one finger and it allows a lot of precision because a small magnifying bubble appears to view in high detail where the cutting line is being traced (Applause PTY LTD).

Image 12: Cut Me In app

Photo Cut-Out allows children to cut out an element in a photo and turn it into a sticker to insert it into new pictures, creating collages from several existing ones. To cut out the element, children must scribble over the foreground and background of the image (Xether Labs).

Image 13: Photo Cut-Out app
Photo cut allows children to choose a background and insert photos, make cutouts, move them and scale them in the space, similar to the previous 2 examples. Layer order can also be rearranged. However, cutting requires a lot of precision and when the layers overlap, it is difficult to move the desired layer (Chun Kit Fan).

Image 14: Photo Cut app

FuntasticFace Doodles allows children to insert a picture and add doodles on it to make the picture funny. It has an interesting system and a very friendly interface for children. In contrary to the Photo Cut app, it allows children to lock certain elements and continue adding others without difficulties. However, it can only be used with the stickers that come in the app and it is not possible to make cutouts of the pictures taken by the children (Lisbon Labs).

Image 15: FuntasticFace Doodles app

Me Comics is an app that allows children to read a comic and to draw a mark over a specific part and record sound. They can save this version of the comics and listen to their recordings when they read it again (Me Books).

Image 16: Me Comics app
5. DESIGN PROCESS

5.1 Malmö City Library

Malmö city library celebrated its 100 anniversary in December 2005. It has 550,000 different media, about 10,000 DVD’s and 33,500 music CD’s. In 2006 it became the first library in Sweden to lend video games\(^2\). Malmö city library is a modern knowledge-based organization with the combination of an intriguing architecture, sophisticated information technology and innovative thinking regarding working within the staff group and the meeting with visitors (Nilsson, 1997).

A library is no longer just an archiving place or a building full of books. Where we use our information resources is as important as how we find them (Druin, 2010). Today’s libraries offer activities and a space for adults and children to socialize, learn or practice a skill, and find sources of information relevant to them, both in digital and analogue formats.

During the observation part of the process, we noticed that the main public for the current space of children between 0 and 8 years old is parents and grandparents with babies and toddlers. At the moment, there is a central area with a helpdesk surrounded by bookshelves. In the middle, there is a set of bookshelves that enclose a space, which is used for storytelling sessions. Children are asked to knock on one of the shelves. It then transforms into a door that magically opens, allowing children into the “Sagorummet”, Swedish for “The Storytelling Room”. The magic works when one member of the library staff goes inside the room from a door on the opposite side of the space and opens it from inside without the children noticing. This is currently one of the favorite spaces of the children at the library.

Image 17: The bookshelf that opens up and the Storytelling Room

To the right of this central part, there is an area with a green carpet where children and parents must remove their shoes before walking in. Small furniture containing books at a height where they are reachable for children, a few toys and places to sit can be found in this space.

Image 18: The space with the green carpet where no shoes are allowed

In this area there is a shelf with computer games that children can borrow. There is also a separate room with books for the older children in this age group where there are also couches, computers and audio books available. This room is currently underused, as it can be found empty most of the time.

\(^2\) Wikipedia, the free encyclopedia
Finally, there is a space for children to do creative activities, where workshops are organized. There are tables and shelves with materials. There is also a “Önskeväggen”, Swedish for “The Wish Wall”. This is a wall painted with chalkboard paint where adults and children have been encouraged to write their wishes for the new space.

The offices of the library staff that are working on the Lilla Slottet project are next to this area. There is also a space for parents to keep strollers and heat up food in microwaves.

I asked 2 members of the library staff what the library means to them. Karin Jonahsson answered that for her the library is a democratic meeting place that will enable people to access information, culture, and literature. It should be a tool for encouraging learning, offering new knowledge, study and creation. She wishes that people at the library will feel inspired and motivated to develop as a person, to share with others and to feel that they can be themselves (Johansson, personal communication, 2014). Kristina Wihlney answered that for her, the library is a place to be, meet and discover new things, free from the demands and necessities and on equal terms for everyone (Wihlney, personal communication, 2014).

5.1.1 First meeting and challenges

During the kick-off meeting, challenges for the project were discussed. The ones I found most relevant for my thesis are described in this section. The complete lists are in appendices 1 and 2. The librarians expressed that they dream of having a place for all children in Malmö, where they can interact in digital, physical and social ways with each other and adults.

According to the surveys realized by the library before the beginning of my research, 82% of the families currently attending the library have parents with academic backgrounds. One result that the librarians gathered is that parents who have access to technology, more often wish to see a technology-free environment at the library. Parents who have easy access to devices and digital tools wish to see other kinds of tools. They wish to find a space that offers an escape from the technology-invaded world. However, parents from poorer backgrounds in Malmö, that do not have the same access to technology, wish to see more technological tools at the library, because their children do not have other environments to try them. As mentioned before, children with little access to digital tools have to rely on institutions (Dunkels, 2007). One of the library’s main challenges for this project is to attract families from the outskirts of Malmö, people from minorities and without academic backgrounds. Adding digital tools is one quality that the new Lilla Slottet should have to offer these families a free space to learn about technology and have a first approach with digital tools. However, one
challenge is finding a balance between digital and analogue materials that makes parents feel comfortable, regardless of different preferences regarding technology in the library.

One important consideration for this space is that children in this age do not know how to read and write yet or that they have just started to learn. In Sweden, children learn to read and write from the age of 7 (The Economist Intelligence Unit, 2008). The new library for children should not be just a space for reading, but where movement and play are allowed and encouraged, while maintaining a calm and quite environment. The librarians wish to build a sustainable space where children can participate in activities, socialize, teach and learn from each other.

The new library should be dynamic, allowing new activities to start spontaneously. This is very important to ensure that children will stay engaged in the activities throughout the years. Digital literacy and image interpretation should be new points of focus in this space, where children can create things together with the help of digital tools. The librarians want to see children leave their mark and share what they create with other children. They also mentioned that it is important that the librarians themselves are well trained in the use of the digital tools they will implement, in order for them to provide proper guidance. However, it is fundamental that children explore on their own. This will also help the librarians learn and grow together as the children also learn to use the new tools.

5.1.2 Lilla Slottet

The two students from HDK involved in this project, Erika Lindmark and Hélen Phan, developed a story about the Little Castle and created a proposal for how to redesign the new space based on the inputs from the librarians and from workshops with children. The age group for the project is very wide, from 0 to 8 years old. The librarians wish to have different activities for 3 age groups within this space. This idea was incorporated by the students in their proposal. However, all children will be welcome to explore all the areas, the age for each space will not be stated.

Image 21: A map of the redesign proposal for the Little Castle

The story of the castle will consist of 3 different countries to explore and conquer, each with a different character who will be represented graphically and will provide explanations for the children. These countries will provide a division for children in age groups, consisting of Lilleputtland, a bright place for children from 0 to 3 years old to explore, Skymningslandet, a dreamy twilight environment for those between 4 and 5 years old and Skugglandet, the land of
shadows for the oldest between 6 and 8 years old, where a character called Lux will help them find light and explore. Between these last 2 countries, No Man’s Land will be a space for all children to make their own. A cave will be a quiet place to hide and read or listen to books, while the Fairytale Land will be the new space for storytelling and the Swamp will be the new space for creative workshops. The information desk will now be called the Little Oracle and there will be a tunnel for children to access the area into the forest, where books will live. Different analog and digital elements should be found all over the world of the little castle.

5.2 First homework and workshop with the library staff

During the kick-off meeting, Unsworn gave the librarians a list of homework. The results from it led to the planning of the first workshop. The homework’s purpose was to understand the activities currently taking place at the space for small children, in order to start seeing them with new eyes. The aim was also to collect the dreams that the librarians have for the new space and to help them imagine situations and conversations taking place in the future at the library.

It was important for me to know how the librarians view the relationship between children and technology, particularly screen-based devices, according to my first research question. To gather this information in a fun way, I used a participatory survey with the 10 librarians that attended the first workshop. I asked them different questions while 2 members from Unsworn held the answers written on papers, facing each other with a few meters in between. The librarians were asked to choose a position to stand between the 2 papers according to their answer. This method works as a scale. For example, if the possible answers are ‘Yes’ and ‘No’, the person can choose to stand closer to ‘Yes’ or to ‘No’ or in between. This exercise was based on Livia Sunesson’s suggestion of a similar exercise that Unsworn has previously conducted. The full list of questions and pictures can be found in Appendix 3.

![Image 22: Livia and Helga from Unsworn hold the answers while the librarians answer by standing on the scale](image)

Most of the librarians feel that their level of confidence regarding their use of touch-screen devices is between average and high. When asked about the level of skills that they consider the majority of children in Malmö to have, they stood in similar positions. They feel that the use of touchscreen devices for children is closer to an advantage than a risk, although some of them stood in the middle. However, the ones who are parents consider their own children to have higher level of skills than the average children in Malmö. These results influenced the evolution of my research question.

I also learned that it is equally important for the librarians that children at the library socialize with other children and with adults. They believe activities should be in the middle between active and peaceful and that the play outcome is more important than the learning outcome. They consider both digital and analogue tools equally necessary and they feel that it is more important that children are engaged in self-directed activities than in instructed ones.

Although this exercise was fun and gave me a general perspective, it was difficult to gather concrete information. This is why I later decided to create an online survey for parents of children in Sweden with similar questions. For the future, Unsworn suggested drawing numbers on the floor between the 2 answers, to make the position of the answers clearer.
In addition to these questions, I asked the librarians to draw different learning skills that they consider important for children and to prioritize their drawings by placing them on the ground. They believe that fun is the most important element that children should find at the library, followed by socializing. General skills regarding analog and digital tools are of average importance, leaving physical activity as the least important. The results from this activity corroborated their previous answer that fun is more important than learning. Later, we discussed with Unsworn that one weakness of this exercise was that they were reluctant to place somebody else’s drawing lower or their own higher on the scale.

The next task was to draw what digital means to them. Since Unsworn and I have been working on the digital aspect of the new library for children, I was interested in knowing what digital means for the librarians. Most of the drawings represented different ways in which information and devices connect people.

I was also interested in seeing which digital tools they find more important that children learn. I gave them different drawings I made and asked them to prioritize them on the floor as before. This time, it was easier for them to place items higher or lower on the scale. They all agreed that being able to produce their own media and digital objects, together with general usage of devices, are equally high in importance, followed by sharing skills through social media. On the contrary, they all felt that videogames, television and use of purchased toys with digital components are not relevant. These answers were another crucial factor for my decision to reformulate my research question.

The next activities were led by Unsworn. Their aim was to get a wider view of the challenges to develop a strategy about how to approach them, using the dreams and current activities gathered through the homework. For one activity, the librarians were divided in teams. First, each team was given creativity and digital add-ons or spices that were written over printed spice shakers, symbolizing that they should spice up their current activities with them. It was interesting for me that 2 of the chosen activities for this task were about storytelling. This is one of the activities that works best and that should be continued. It also provides a design opening to innovate through storytelling and the digital world.

For the last task, the teams were asked to pick some of the different challenges for this project and turn them into a tree. Their task was to write the roots or causes for the challenge and to produce fruits or possible approaches for it. I found 2 challenge trees especially relevant for my project.

The first tree asks how can we engage children from 5 to 8 years old? Younger kids currently dominate the area. Children from 5 to 8 must be given their own space and activities. Possible approaches were to add challenging technologies and book-drops shaped as monsters. The concept developed by HDK students acknowledges this challenge. The mention of monsters is relevant because it implies that it is necessary to implement storytelling elements specific for this age group.

The second tree asks how can we create a library, which is changeable and dynamic? It is important to implement new activities that do not require too much time and preparation to be changed, as well as to develop new habits, or lack of them, for the library staff. It is necessary that they have new materials to help them with this challenge.
5.3 Survey for parents

I created an online survey for parents in Sweden. However, I only received 29 responses and therefore, the statistics mentioned should not be taken as a generalization of Swedish parents. The complete overview of responses can be found in appendix 4. I decided to ask parents with children under 12 years in order to gain a wider perspective on parents and technology. I first asked how many children they have and their ages. The youngest is 2 months old and the oldest 17, although with a sibling under 12. 15 of the parents who answered have at least one child within my target age group.

59% of the parents who answered feel that their own skills with touch-screen devices are very high, but only 24% felt that about their children. This was strongly connected to some children being less than 5 years old. Only 7% of the parents answered that they do not restrict at all their children’s use of screens. Some relevant answers regarding restrictions were about allowing the use of only one media at a time or no violent games. One parent said that TV is a good method to calm children down after school but only for a short time. Other rules included no Internet or no screens before bedtime. One very interesting answer was a parent who allows children to interact with screens only half the time that they spend playing outdoors. Only one parent uses talks about what is inappropriate as a method and one parent said that it is important to use devices together with children to teach them how to be critical, safe and balanced.

Most parents believe that children should start using touch-screen devices between 2 and 5 years old and none of them believe that it should be after 8 years old. However, most parents believe that children should have their own device until 8 to 11. 28% believe that this should happen after the age of 12 and only one parent answered that below 5 years old. Most of the parents play with their children and devices once a week or more.

Regarding the relationship between children and technology as a risk or an advantage, results deferred a lot, although the majority felt that it is either in the middle or closer to an advantage. Parents described many advantages that they find from the use of technology, such as problem solving or logical thinking. They said that technology offers new ways to communicate, to learn languages, to find inspiration, to interact with others, to easily access information that parents do not know about, to keep in touch with people who are far and to learn in an interactive way. Many parents mentioned that technology offers necessary skills for the future and one parent said that it is a new way to learn and empathize with people around the world and their different situations.

They mentioned as well many risks, both physical and social. The physical risks they mentioned are eye or neck problems, lack of physical activity and not knowing how to interact in reality with everyday physical tools, such as paper. Social risks they mentioned include abusive use, addiction, aggressive behavior, lack of oral communication skills, isolation from other children and the real world, bullying, lack of imagination and creativity, access to wrong information and not being able to measure the consequences of sharing their information publicly. In addition, one parent mentioned that it is also
a risk when parents neglect their children and allow devices to entertain them constantly and another parent mentioned that constant brain activity from receiving too much information is also a risk.

5.4 First concepts

As a next step of my process, I developed 4 ideas based on different aspects of my theory as I moved from a screen-less approach to redefining the use of screens by encouraging active engagement with digital and analogue tools. In this section, I will briefly explain each concept, the theory behind them, and their strengths and weaknesses. In order to evaluate each concept, I created a table for each of them where I included 7 main aspects from my theoretical framework, as well as the connection of each concept to the library setting.

For my final concept and research question, I chose to focus only on the second and third roles of electracy, on collaborative play and on storytelling. However, when I first created these tables, I still had an interest in the first role of electracy and in open-ended play. This is reflected in concepts 1 and 3, where open-ended play is a main strength. These tables had a strong influence in discarding those 2 concepts and this decision was later strengthened by theory and by the experiment and workshop with children, where it became clearer that children within this age group have a stronger creative potential when given an initial task, rather than through an open-ended and self-player approach.

I chose the 7 concepts on these tables based on the 3 chosen theoretical concepts for my thesis (Image 5). From the theory of electracy, I chose to analyze my concepts in relation to the 3 new playing roles suggested for small children. From the theories about children’s learning abilities and the connection between adults, children and technology, I evaluated my concepts in relation to the level of collaboration that children can have with other children or with adults. These elements support learning by imitation and collective learning. They are also 2 of the main challenges for this project. As explained in the Theory section, familiarizing adults with technology and including them in digital play with children is crucial for children’s elective development. This is another reason why I included collaboration with adults in this evaluation. Finally, I included open-ended play and storytelling from the section about play. The other 2 points discussed in this part of the theory are adventure playgrounds and engaging children in play. Adventure playgrounds were the main theoretical background to develop concept 3. However, it is not an element that I believe should be included in all the concepts. Engaging children is crucial when designing for them. However, it is not possible to evaluate this element in a table without testing each of the concepts. Analyzing this element would be exclusively an assumption.

On the contrary, the 7 elements I chose can be evaluated for each concept based on theory.

Each concept was evaluated depending on whether it allows children to exercise the 3 different roles of electracy, to collaborate with other children or adults and to play through an open-ended approach and through storytelling. The main argument behind making a tick in each element is whether or not the concept allows children become engaged through each of these elements. However, having a tick on a particular element does not mean that children will necessarily behave in that way. To further develop any of these concepts, further testing with children would be required. Nevertheless, this analysis was crucial because it helped me discard the first 2 concepts and strengthen the decision of discarding the third one after the experiments at the library. I chose to test this third concept because I was interested in experimenting whether children at the library could become engaged through a completely open-ended approach. Through this method, it is clear that the fourth concept is the strongest based on the chosen theories for this project.
5.4.1 Control Remote Objects

How does it work? The tools in the game are objects and a tablet/smartphone app. Each object has a different shape and color. The app has graphics with the same shapes and colors. The initial setting of the game is that an adult holds the device and children hold the objects. The objects react when the graphics are manipulated on the app and the object on the app reacts when a child interacts with one of the objects. For example, if the adult taps on the red circle, the red ball will light up and if the child squeezes the red ball, the graphic of the red circle will shrink in the app. Children and adults make their own rules, players can be added and elements can be exchanged between children and adults.

What are the strengths? It helps children explore the connection between the real and the digital worlds. This concept takes strong elements from open-ended play by providing different tools with minimal interaction rules and without game rules. It is collaborative and it includes adults in the game.

What are the weaknesses? It has little connection to the library setting and due to its open-ended play characteristics, it is a risk to estimate how often and effectively the tools would be used.

5.4.2 Design Your Own Interface

How does it work? Children receive the task to design their own interface on a huge analogue laptop. The interface should be based on a concrete idea that is developed either by the librarians or by the children themselves during a previous workshop. They repeat this task on different objects, either existing ones or objects that they bring or build. How would an interface look on a smartphone, a ball or a teddy bear?

What are the strengths? It approaches media production through the use of analogue tools. Children learn how to explore the concept of alternative interfaces. It allows collaboration with other children and adults.

What are the weaknesses? This activity would be part of a workshop, where adult intervention would be required. This does not allow the role of the self-player. Giving children within this age group the task to build an interface without a narrower concept is a very complicated task for them. Children need a concrete starting frame to begin with. It is important that children start creating through concepts that are familiar to them and make them feel comfortable (Druin, 1996). Otherwise, it would be difficult for the children to complete an interface.
5.4.3 Technology Adventure Playground

How does it work? It is a free space full with digital and analog objects where children are able to explore and build without adult guidance. The space could also be used for workshops in collaboration with the librarians. It is based on an adventure playground but with the risks being digital or technological instead of physical.

What are the strengths? It allows children to explore freely and it helps parents understand that risks, even the ones coming from technology, are something children have to face and conquer on their own. This concept could be strengthened by reflective talks about the way it is used.

What are the weaknesses? It is a risk to know how the space would be used and to measure if children would collaborate with each other or play individually. There is also little relation with the library setting and it would be difficult to measure electracy outcomes. This concept is more experimental and it led to later experiments at the library.

5.4.4 Little Researchers Adventure

How does it work? Children receive an adventure pack from the librarians. This pack includes a small tool with a camera and an element for a story, such as a character, a place, an object, etc. The children go on an adventure to find books that have images of the element they are looking for. They can ask the librarians for help finding the books. The children can take pictures of as many elements as they want to. Once they have collected enough images, they go to a screen on a wall where they transfer the images and combine them to create their own. They can also add their own drawings. As children learn how the game works, they will also be able to play without a starting story in the adventure pack. The game is meant to be played in collaboration with other children to allow them to go on an adventure and explore the Little Castle with their friends. However, they can also choose to explore alone or with adults.

What are the strengths? It supports all electracy roles, especially collaborative play and media production. It allows collaboration with other children and with adults. In addition, it is strongly connected to storytelling and the story created for the Lilla Slottet. It supports exploration of the new space through the use of both analogue and digital tools. It helps children learn about visual literacy and it allows them to share their knowledge with other children and create an archive of visual research for the library. Once a system is created, the librarians can easily change it and add new elements to
the activity, making it dynamic. This stimulates engagement throughout many play sessions. It also enhances the role of the librarians and the children’s connection to them.

**What are the weaknesses?** Technical aspects of real implementation are a risk. The concept needs further testing with the children and training of the library staff in order for it to work properly. It might be difficult for the children to understand it fast. It does not support self-play in the first play sessions. This means that the learning curve is longer, children need to learn how it works before they are able to play without an initial input from the librarians.

### 5.5 Second homework and workshop with the library staff

For the second homework, Unsworn gave the librarians several tasks. However, I will only discuss one of them. The librarians had to interview children that visit the current space. They performed 12 interviews where they found out their ages and where they live in Malmö. They also asked information about their favorite characters, their hobbies, information about their friends and about how they play. Unsworn asked the librarians to try to find out if children use apps to produce their own media, a relevant concept in my research. In addition, children told about what makes them happy, sad, angry, or scared and about what they would like to see at the library. The complete list of questions and answers can be found in appendix 5. The interviews were performed in Swedish.

One of the most relevant results for my research was that all children, except for one who spoke little Swedish, had favorite characters. They mentioned characters from recent books or movies, such as the Lego characters from *The Lego Movie*³ or *Batman*⁴. The librarians noticed that actions stories seem to be trendy amongst children in this age group. This could be used for the *Little Researchers Adventure* concept, as a way to start creativity and as ideas for the Adventure Pack. One possibility could be to spice up one of their favorite characters, by adding new features to it.

Regarding media production, two of the children answered that they make their own movies, one of them also records music and one boy said that he likes to record his voice.

For the second workshop organized by Unsworn, the librarians worked again divided in 3 teams, using the results from the first workshop and from the second homework for the activities. They had one activity throughout the workshop, which was divided throughout the day. Each team had a different challenge to work with: How do we engage children from 5 to 8 years old? How do we attract children who do not currently attend the library? And how do we support children from different cultures? Through different tasks, the librarians had to define the background for these challenges and create personas based on the children they interviewed to understand how these challenges affect them in order to develop ideas to face them. They chose one of these ideas and developed it further by defining the room in which it would take place, the activities necessary to develop it and the digital characteristics for it. Based on these results, each team had to prototype their ideas with a material kit that Unsworn provided them. The results were very fun and they allowed the librarians to try a creative hands-on approach for some of their main challenges.

All the teams incorporated storytelling in different ways. The ideas included a tree with different levels for children from 5 to 8 years old to climb, a dark cozy Bedouin tent with a starry ceiling for children from different cultures to find a sense of belonging, and a space to tell representative stories from other cultures, with a changing room for children to build costumes and dress up as characters that are not currently known to the majority of Swedish children.

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³ *The Lego Movie* is a 2014 computer animated adventure comedy film produced and distributed by Warner Bros. Pictures.

⁴*Batman* is a fictional character, a comic book superhero appearing in comic books published by DC Comics.
In addition to this, I also had an activity during this workshop. I was interested in understanding why it is important from the librarians’ perspective that children learn to produce their own media. For this purpose, I used a pillar at the Unsworn offices. The bottom, where I placed a sketch of the library, represented the library at the start of the project in 2013 and the top represented the library of the future. I built a set of Lego blocks made of paper and gave the librarians the task to give support for the library to stand on its own at the top. I moved the library sketch to the top and placed the first Lego block at the bottom with the question ‘How do we help children produce their own media?’ written on it. Next to it, I placed an arrow with the question ‘Why is this important?’. Each of the librarians had to answer this question on a new Lego block and place it on top of the previous one, as well as move the arrow to point to this new block. This way, each person could answer ‘Why is the statement that the previous person made important?’.

One weakness of this task was that it was not possible to have a specific time for it. The members of the library staff had a very limited amount of time. Some of the activities planned by Unsworn had to be shortened and not everyone was able to participate in my activity. However, their thoughts were important because they corroborated that the librarians are also thinking in the sense of electracy, even if this is a new term for them. The sequence of their answers is the following:
Why is it important to help children produce their own media? ➔ Because it is an important knowledge of the future ➔ This is important because it places children in the center ➔ This is important because it helps children learn from each other ➔ This is important because by teaching something to someone else, children grow in self confidence ➔ We can aid in this confidence growth by offering tools that help children produce media together ➔ This helps children socialize without an interface but still using digital media ➔ This is important to help children use all their senses to trigger their imagination and creativity.

Through this exercise, I learned that the librarians and I have a same understanding of the importance of helping children produce their own media. I agree that this is a crucial learning for the future, that will help them have a new way to socialize and become self-confident by stimulating their creativity and imagination with the use of digital tools.

5.6 User testing

The next step was to test the ideas. Because of the weaknesses described in some of the projects, I decided to test only 2 of the concepts: The Technology Adventure Playground and The Little Researchers Adventure. I will also describe some of the experiments conducted by Unsworn that were relevant for my final design concept.

5.6.1 Design experiments at the library

I went with Unsworn to the library to perform experiments at the current space. They had performed previous experiments at the library where, amongst other things, they left an iPhone inside a small cardboard robot in different parts of the library with the video of someone giving a book recommendation. In the same way, librarians and the children themselves were encouraged to record new videos. This concept is interesting for my project because it helped me think of different ways in which children can share what they produce with others, teach them how they did it and find or leave recommendations for future play activities.

Image 31: Unsworn’s experiments with book recommendations

To test The Technology Adventure Playground, I built cardboard buttons. I created a small area with tape that said “Lek med oss”, Swedish for “Play with us”, and left the items there to perform observation during one week. Unfortunately, I rarely encountered children interacting with them. However, every time I was there, I observed that the parts had been moved and they grew more destroyed each time. The few children that I was able to observe stepped on them or tried to take them away but the parents always stopped them. However, I noticed that the most interesting part was when I was putting the tape to mark the area and create the text. All children that passed stared at me and seemed interested in discovering what I was doing. As children learn from imitation, it is important to consider observation as a part of play and learning. This can be used to stimulate interactions of both action-oriented and observation-oriented children (Harvard, personal communication, 2014). For a more reliable appreciation of this concept, it would be necessary to test with a lot more items in a defined area and to bring the children to play without the parents, stressing that they are free to leave at anytime. However, proper observation would be difficult to achieve and document.
Unsworn also tested an app to create stop motion movies using a small stand that they built out of cardboard, with marks of where an iPhone or iPad should be placed to make it stay still to take pictures while children produce the movies. The image coming from the device was projected on an inner wall of a bookshelf for the children to see their process and the finished movie as a big image on the wall. Other children and adults can also observe and learn by imitation. In the beginning, there was a boy in the space who was curious but reluctant to try it. However, as Livia from Unsworn started using it, the boy gained confidence to approach her and the stand to create his own story. This idea offered an interesting inspiration for how my final concept can be implemented in reality. One important observation we made is that children that are used to devices are no longer impressed with something that happens on one. However, seeing what they are doing projected on the wall and in a bigger size helps increase their curiosity and motivation.

5.6.2 Workshops with children
To test the Little Researchers Adventure concept, I organized a workshop with children. Children should have the freedom to perform the activities with the least instruction possible and to use the setting where the workshop is taking place as an advantage (Harvard & Løvind, 2003). During the activities, the children used normal tools, like pencils, markers, glue sticks, scissors and paper. Materials that children have had experience with before and that make them feel comfortable make the design process something familiar to them (Druin, 2010). The only extra tools that I gave them were lo-fi iPhone cardboard costumes that were fast for me to build and easy for them to use. They had a very simple and resistant straps mechanism to make them tight around the child. It is a risk to try hi-fi prototypes with children, since they can draw too much attention and distract them from the workshop’s tasks. Children can be distracted by a shiny and attractive prototype that looks more like an art piece. Instead, tools for workshops must be robust and safe. (Harvard & Løvind, 2003). One thing that I was able to observe during previous research with children within this age group, such as the Nalle Music Hoops, is that children are unafraid of breaking things and using their strength.

For the planning of this workshop, I discussed my ideas with Marie Ehndal and later with Åsa Harvard. Åsa Harvard stressed the importance of peer observation and peer collaboration for my concept. This can be strengthened by offering observation spots for some of the children, while others play. Åsa Harvad is currently writing her PhD with Lund and Malmö University in cognitive science and interaction design. In her research, she has discovered that peer collaboration
is an effective approach to include both action-oriented and observation-oriented children in one activity. Some children are eager to try new things even before fully understanding how they work, while others are more reserved. However, the latter can become more interested in participating in an activity after observing others engaging in it. Design that considers both types of children helps provide them with different involvement possibilities that will strengthen their self-confidence. Learning from peers increases children’s motivation to take part in an activity (Harvard, personal communication, 2014).

Marie Ehrndal helped me shape the workshop and gave me feedback about finding a balance between giving children concrete tasks to help them get started and still allowing them to have enough freedom to be creative. Together with 2 members from the library staff, Karin and Kristina, she assisted me during the workshop and helped me with the tasks for the children and the language. Their help was also crucial because the children were divided in 2 groups and it would not have been possible to hold the workshop and document it without all the help I received. In the beginning, I gave everyone a printed version of a detailed description of the workshop that can be found in Appendix 6.

The main goal of the workshop was to explore children’s ability to do visual research. There was also a main focus on children’s narrative abilities. They were divided in two groups with one librarian and one designer in each group, although I took turns between both to document. Each group created characters based on a setting that we provided them. One group had a traditional fairytale setting, while the other group had a setting in the digital world. These settings were later discarded, but it was a good starting point for them. It is important to give children the chance to get used to designs and tasks during a workshop and to give them enough time to understand them (De Valk et al., 2013). However, time limitation was a big challenge because the children could only be at the library for one hour. This made it difficult to give them freedom to explore, since we there was constant time pressure to move on to the next part of the activity.

In the first group, they were divided in 4 teams and each chose a character. Their task was to find different books in the library with images that they could use to build the character they chose. These teams started with an exploration of the different rooms of the current space. Afterwards, they took the books they chose with them and they were working at the room that is used for workshops where they had tables and chairs and enough space to sit with their teams and work with the books they selected. There they received transparent paper to draw over the parts they found interesting. The children then put the parts together, colored them and added their own elements. The characters that they designed in this group were a monster girl, a magic horse, a witch and a dragon.

The girls who drew the monster girl explained how they took the head from a monster, the tongue from a dragon and the body from another character and how they later drew a background with grass and stars around it.
The magic horse has different powers and can eat a lot. It eats all animals, except the small ones.

Image 35: The Magic Horse

The group with the witch had a very interesting and abstract shape that they also took from several witches books. Their character was inspired by a Swedish television character, called Häxan Surtant⁵. They explained that she has the abilities to conjure everything, go through walls and turn into other shapes.

Image 36: The Witch

The team with the dragon also explained that they took elements from different books. They divided the transparent paper and drew a different part each. They later glued the parts together on another paper. They had a character with a lot of details and were unable to finish coloring it, but they repeated several times that they would finish at school.

Image 37: The Dragon

In the second group, I gave the children 3 cardboard iPhone costumes that I built. Originally, I planned to use them together with a cardboard iPad costume that was meant for myself. The idea was to test the Build Your Own Interface concept and it was inspired in a robot costume that Sveta from Unsworn used during workshops with children for her master’s thesis as a method to bridge the language barrier (Suvorina, 2012). The workshop finally took place after that idea had been discarded but I decided that the cardboard iPhone costumes would still be a good form of inspiration for the children to build a character on them. Because of this, their starting setting was a world in the future. The children divided in 3 teams. One of the children could wear the iPhone costume while the other ones built a character on it. It was suggested that the children should rotate every 10 minutes, but they were free to decide to do this differently. I also gave

⁵ Häxan Surtant (The Sour-Hag Witch), also called ”Världens suraste och elakaste häxa” (“The sulkiest and meanest witch in the world”) in the beginning of the programs, is a Swedish fictional character who appears in SVT. Now 4 TV series about ”Häxan Surtant” have been broadcast, and all of them are directed and written by Carl Englén. The narrator (called Pratgubben), who always appears, is Sven Björklund. From Wikipedia, the free encyclopedia
them papers with printed images of different eyes, mouths and noses that they could cut and paste on the iPhone’s screen. They also had markers to draw other parts of their characters. Two of the teams built a monster and the third one built a zombie rabbit. These teams finished faster and had time to create stories for their characters. They were sitting on the green carpet on the floor, while Karin and Marie helped them to elaborate on the stories by asking questions.

Image 38: The sets of eyes, mouths and noses that the children received

The explanation for the first monster was that he eats rabbits, people, books and zombies. He also drinks blood and therefore has blood on his teeth. This team had an ongoing discussion with the zombie rabbit team about which character eats more. In this team, one of the children was very dominant. He was often wearing the costume and drawing himself on it, while the others watched. He was also the one creating and explaining most of the story for this character.

Image 39: The First Monster

The Zombie Rabbit started as a normal rabbit. However, one of the children drew a thought bubble for it and another one stated that it looked like a third ear. This is how he became a zombie. They said that he eats hearts and blood. The choice of a rabbit came from a carrot that they had as one of the options for a nose. However, they said that the Zombie Rabbit only eats blood carrots. He does not have a family and he lives alone in a grove. There was also a very dominant boy in this team, he insisted several times that their character can eat a lot more than the monster from the previous team.

Image 40: The Zombie Rabbit

The second monster, called Monster Abyss, was inspired by an American wrestler who uses this as his ring name\(^6\). He lives in the forest and he is very strong. He has a very long tongue and a knife in his hand with blood. He also has blood on himself that came from fights with others. The boys from this team affirmed that their character is not polite.

\(^6\) Christopher J. “Chris” Parks (born October 4, 1973), better known by his ring name “The Monster” Abyss, is an American professional wrestler signed with Total Nonstop Action Wrestling (TNA), where he is the reigning Television Champion in his second reign. From Wikipedia, the free encyclopedia
At the end, the children went into the Storytelling Room inside the bookshelves, where they told details about the stories of their characters to all the other children. Kristina asked them questions to stimulate their imagination.

I explain in detail these stories that the children made to show the level of their imagination and to demonstrate what they were able to create with a few simple inputs, instructions and elements, in spite of the time limitations. I also explain in detail to understand the interactions between the teams and how the stories of one character influenced another team as the children heard the stories. It was also interesting to observe the difference between more dominant or shy children. Before the workshop, I believed that the children would fight about wearing the costumes because they would all want to wear them. However, because the role of the one wearing it was more passive, the children had more arguments about wanting to be the one drawing on it. In general, the children collaborated really well. There were no real fights in any of the teams or no children working completely on their own. They all understood the task to create a character of their own and all the teams successfully accomplished it.

These are some of the main observations that came from this workshop and other parts of the design process that helped shape my final design concept:

- Children within this age group can be incredibly creative with very simple starting instructions, allowing them to use their creativity and self-direct the process for a task, using the tools available. In comparison between the cardboard buttons experiment to this workshop where children had a specific task, it is clear that the latter was more engaging and stimulating for their imaginations, even if the beginning was instructed.
- Open-ended play in the library context is not an appropriate approach for this age group. However maintaining elements of open-ended play gives children the freedom to be imaginative.
- Complete stories can originate from small details, as seen in The Zombie Rabbit, when the thought bubble of a normal rabbit turned into a third ear of a zombie rabbit.
- Children in this age group are able to do visual research in different books. They also understand the task of putting the parts together into building one image.
- Children like sharing their creations and the stories they hear from other children helped shape their own.
- Children can handle complex visual tasks to produce artwork with abstract characteristics and high quality.
6. FINAL CONCEPT

Image 43: Explanation of the Little Researchers Adventures.
The design I chose to work with and present to the library staff was *The Little Researchers Adventure*. After analyzing the results from the user testing and discussing the concept with the librarians, I modified this original concept to better respond to the challenges of this project and to properly ground it on the theory.

In this section, I explain a possible scenario for how this system could work from the moment that children want to go to the library until they reach the different stations in an illustration (Image 43). This scenario is a hypothetical case where 3 children get the task to do visual research to create a monster. This illustration is also a next step in the project. With the approval of the librarians, this comic could be shared through social media to people in Malmö in order to receive feedback, suggestions, comments and votes about the concept. *The Little Researchers Adventure* is a new system in the library for children to explore the new space, making them feel confident and comfortable there. Children should see this system as an adventure, where their mission is to collect different books and drawings, transform them into a digital form and combine them into a single image. With the visual information they collect during their quests, they can create their own element for a story, such as a character, a place or an object, with parts from different existing illustrations in different books and from their own drawings. However, this system has many possibilities of usage and it can be changed and expanded by the librarians easily. Because of the age of the children and findings during this thesis, my suggested scenario starts with a specific instruction. However, children are free to do what they want with the system and discover the tools available through it. The purpose of the instruction, as in the workshop, is to give children a starting point to get their imaginations started. The steps that they take and the final outcome can be independent from this instruction.

### 6.1 How does it work?

The children will receive an Adventure Pack created by the librarians. There will be a basic system for it, making it easy for the librarians to adapt it to different number of children and possibly adults, using elements from popular stories, from imagined ones or from stories from different cultures unknown to most Swedish children. The elements could be characters, places, things, or anything that the librarians or the children decide to invent. Inside the Adventure Pack, they will find headphone hats, such as the ones from the Interactive Libraries at Aarhus, a treasure map to explore the library and help them go to 5 different stations and other surprises (The children’s Interactive library video, 2008). Station 1 is the desk of the librarians, or Little Oracles. Station 2 is the Book Forest, where they can take different books for the task. Station 3 is a scanning spot. Station 4 is a screen or projection where they will see their scanned objects and manipulate them and station 5 is a tangible interface that consists of a rope. When it is pulled, a screenshot is taken and uploaded to the Lilla Slottet’s Instagram, creating a visual archive of children’s creations and experiments.

### 6.2 How could it be implemented?

Many technical and implementation details are not fully defined, further experimentation and testing are required. However, I explain possible options of how this could be solved in reality. The headphone hats could be standard explorers hats, they could be created by the librarians or the children could build them to adapt to the theme they are researching. The headphones could be taken to different stations where the children could listen to instructions recorded by the librarians. This would also make them very easy and fast to modify and easy to understand for children that do not know how to read yet. The headphones could work as normal ones that are plugged into a device with a play button or
through RFID tags, such as in BibPhones from the Interactive Libraries at Aarhus (The children’s Interactive library video, 2008). There could be different headphone stops with instructions or hidden messages.

In order to stimulate children teaching and learning from each other, it would also be possible for them to record videos of themselves going on an adventure and explaining what they are doing at each station. When other children come, they could find a device in each station with a video of previous children engaging in the activity, similar to the experiment that Unsworn did at the library about book recommendations with iPhones. Another possibility to engage both action-oriented and observation-oriented children in play is to have a specific space around the stations where other children could come and participate as peer observers. This would help them understand the game first by observation and motivate them to engage in it themselves. Another possibility is to have different teams playing at the same time and encouraging them to collaborate to create different elements or characters for one same story.

I found 2 different options of how the scanning station could be implemented. The first option includes the use of special library cards for children that can store information, like a flash drive. This way, children could also take their creations home with them and see them again on their next visit to the library. The new library blocks would work as the story cards from the Pogo Project (Phillips Design video, 2007). The children would insert them into a table with a camera or a scanner in Station 3. They could place as many books or drawings as they like, scan them and store the digital information in their library blocks. Afterwards, they could take them to Station 4 and insert the story card there, where the images would be transferred to a touchscreen with a software similar to the apps I analyzed (Cut Me In, Photo Cut-Out and Photo Cut) in order to edit them and produce their own images (Applause PTY LTD; Xether Labs; Chun Kit Fan).

The second option would be to use something similar to the cardboard stand that Unsworn used during the stop motion movies experiment at Station 3. Tablets would be placed there with one of these existing apps. Children could take pictures and then project them onto a wall. The wall would be Station 4. Although this method is less active than the previous one, it offers a more realistic and low-cost possibility.

When discussing the concept with the librarians, their main concern was that it might be too complicated for the children to understand. Based on this feedback, I made the decisions to add spoken instructions with the headphones and the possibility of children recording instructional videos in addition to the observation spots that I originally suggested.

6.3 How will adults be involved?

My concept, combined with the new name for the librarians in the story of the Little Castle as Little Oracles, reformulates the role of a librarian at the children’s library as collaborative members in their library experiences. The librarians will decide the elements of the Adventure Pack and they can record different messages, making the concept friendly, dynamic and changeable. Children would also be encouraged socialize with the librarians and come to them for help.

In addition to electracy skills, children will also be able to improve their abilities to create stories, as well as their presentation and socializing skills as they become storytellers. Children take elements from the environment surrounding them to imagine and create stories. When the librarians plan the Adventure Pack, it should encourage natural play, giving them the least instructions possible. They should keep in mind a balance between giving the children a starting point and allowing them to have opportunities to shape and modify the system.

Storytelling sessions could also be organized afterwards for children to share the stories of their creations and become the storytellers, while getting ideas for new elements to build and finding new friends for the activities.
The role of adults during the adventure is to guide children and allow them to decide if they want to go on the adventure on their own, with other children or if they want the parents to be included in the game. Parents, teachers, librarians and other adults should also be encouraged to go on an adventure on their own and explore the technologies as well. Even though the Little Researchers Adventure would be initiated by adults, it maintains several elements of open-ended play. Even though it has a specific goal, children are free not to follow it. They are encouraged to improvise, play spontaneously, use their imagination, create their own rules and develop their creativity through it.

6.4 How does this concept contribute to solving other challenges for this project?

In addition to being a system to help children explore the library in a collaborative way and supporting them to become electrate and produce their own media, this concept also supports some of the other challenges of the project. Two tables with the complete lists of general and digital challenges for this concept can be found in appendices 1 and 2 with a tick mark that represents whether this concept offers a possible solution for each challenge.

Through this concept children will exercise learning by imitation while observing videos of other children that have used the tools before. Their learning will be inductive because children will have to categorize elements to create a character, place or object. They will also develop patterns and systems to interact with the tools and take advantage of them in a way that it is fun and engaging enough that they want to do it for long periods of time and throughout many visits to the library. Otherwise, they will lose motivation and not use them. It could also help children develop symbolic representation, remembering and problem solving skills. (Whitebread & Bingham, 2013).

By offering a starting point and then allowing children to explore freely, it is also acknowledged that children can have different interests and that they might choose to do something completely different to the instruction given. One of the exciting parts of this concept is that it would allow adults to be surprised with the end results and it would be interesting to test how much they differ from the original instruction. If the Little Researchers Adventure is implemented, adults are advised not to interfere with children’s fantasies and imaginations, even if they go really far from the original instructions, but instead to offer guidance. Children need experiences that allow them to have sensations and explore on their own. This was a motivation to turn the system into an adventure that children might want to conquer, offering fun and collaborative experiences for everyone visiting the new Lilla Slottet.
7. DISCUSSION AND CONCLUSION

7.1 Answer to research question

Throughout this thesis, I explored the theoretical concepts of electracy, learning abilities and play for children between 5 and 8 years old at Malmö City Library. I conducted observations, participatory design workshops with the librarians and experiments at the library with children in collaboration with Unsworn Industries. I had talks with the parties involved and experts in the field and I created an online survey for parents. With the results from these explorations, I designed a concept and organized a workshop with children to test it. The concept, Little Researchers Adventure, aims to help children build elements for a story, such as a character, place or object, using images from books and their own drawings as references. The concept’s main goal is to provide a system for children to collaborate and produce visual media through the combination of analog and digital tools.

My research question for this thesis is the following: How can Malmö City Library help children between 5 and 8 years old become electrate, with a focus on collaborative play and media production skills development, through a combination of digital and analogue tools?

I answered this question through the concept of storytelling and by creating a visual research system in the library that allows children to explore the new space and produce images and stories, using analogue and digital tools in collaboration with other children and adults. To evaluate my final concept in connection to my research question, I divided the question into the 4 elements in Image 44.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Final Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection to the library setting</td>
<td>✔️</td>
</tr>
<tr>
<td>Role of collaborative player</td>
<td>✔️</td>
</tr>
<tr>
<td>Role of media producer</td>
<td>✔️</td>
</tr>
<tr>
<td>Use of analogue and digital tools</td>
<td>✔️</td>
</tr>
</tbody>
</table>

Image 44: Evaluation of the final concept in relation to 4 elements of my research question

This system was inspired on the design of the story for the new space, while including the librarians and books from the library as elements in the system’s tasks. This argument supports the concept’s connection to the library setting.

Based on Ulmer and Erstad, I define being electrate as having the necessary skills to read, understand, interpret and produce visual and digital information through digital tools. An electrate child is one who has the ability to make decisions on his or her own, while collaborating with other children in a play environment (Ulmer, 2002; Erstad, 2003). I suggest 3 new roles for children in play environments as self-players, collaborative players and media producers.

My research does not support that children between 5 and 8 years old should be completely independent to decide what they play. However, the first role is still incorporated into the concept by giving children the freedom to decide to engage in this system or in other digital and analogue activities that will coexist in the new space. In addition, children will be free to use the tools in other ways and create their own systems with them.

I added a tick for the role of collaborative players on the table because the system encourages children to go on an adventure with other children, simultaneously with other teams or in collaboration with adults. Collaboration is also stimulated by peer observation, either at the moment of the interaction or afterwards, by recording and watching videos of children who have done it before. Furthermore, it allows children to share their finalized images, contributing to a new
visual archive of children’s creations on Instagram. Finally, it helps reformulate the role of librarians as collaborative members in the activities with children.

Through this system, children are able to improve their visual literacy skills by taking analogue images and combining them through digital tools to produce their own aesthetic elements. This visual research allows them to understand and analyze images to create their own stories and narrative elements. These are the arguments for having a tick the media producer role and the use of digital and analogue tools.

7.2 The future of the project

After the completion of this thesis, Unsworn will continue with their process and develop their final concepts to present them to the librarians, who will decide which ones will be implemented. For my concept to take this step, it is necessary to do prototype testing with children. This step is crucial to analyze how much freedom and collaboration children can manage and the level of the external influences required for them to feel challenged, letting children be the judges of what they can and can’t do on their own (Erstad, 2003). It is also necessary to do user testing with the librarians and experiments to determine technical and realistic aspects of the implementation. As previously mentioned, the biggest concern of the librarians regarding my concept is its complexity.

Further testing would help determine the learning curve for both children and librarians. It would also aid in evaluating whether the concept is a realistic solution for the project’s challenges and if it could be implemented in addition to Unsworn’s concepts, based on budget and time possibilities. These constrains would also determine whether to use existing apps on an iPad or if it is possible to develop a software for manipulating the gathered images digitally. In the latter, creating an option for tracking back the images to the original sources could also be included. This feature would add a referencing system to help children track their own steps or the ones of other children for new creations.

If the concept were to be implemented, it would be necessary to design a treasure hunt map that is easy for the children to understand, allowing them to easily find the 5 stations for the process and to get an overview of the whole area. It should also be in a format that helps the librarians modify it in the future to maintain the flexibility of the new space and to adapt to future challenges they might encounter.

Another suggestion to test the acceptance of this concept is to ask the library staff to share the illustration of the concept publicly through social media. This would allow parents, children and other librarians to give direct feedback and vote whether or not this is an idea that they would like to see implemented, incrementing their real power to decide about the future of the space for small children.

After the implementation of the system, storytelling workshops and sessions could also be planned to help children create and tell stories of the elements they previously created. Based on theory and the online survey for parents I developed, I learned that one of parents’ concerns regarding technology is the ability of their children to reflect on how they use them. Workshops and storytelling sessions could also help adults address fears about technology and help children reflect and become critical about the elements and stories that they create.

Regarding the academic future of this paper, I suggest for other designers to include electracy and new playing roles for small children in their designs. The findings from this thesis can be applied for future design projects for children in public spaces, regarding collaboration, storytelling, play and improving new literacies’ skills. I encourage designers for children to reflect on the changes to the structure of institutions of knowledge when creating innovative concepts for children, including either analogue or digital elements. This will be further explained in the discussion for this project.
7.3 Discussion and knowledge contribution

For this thesis, I analyzed 3 main theories: electracy, children’s learning abilities and play. To explore these, I followed a design process, partly in collaboration with Unsworn Industries. Finally, I developed a concept to answer my research question, which is a collaborative system for children to do visual research at Malmö City Library. This concept provides children an early research experience, as they gather information from different sources and create their own contribution to the visual world of the Lilla Slottet, using analogue and digital tools. This idea was inspired by the research that I conducted during this thesis, as I collected parts from different references to produce knowledge.

Electracy is a theory that I chose because of the wide perspective it includes, compared to digital literacy, because it includes changes in structure for institutions and in the roles of children as the world adapts to a new digital era. Terms as digital or visual literacy refer exclusively to a set of skills, whereas electracy combines the skills of these literacies and acknowledges that new institutions and forms of education need to be developed (Erstad, 2003; Ulmer 2002).

This change in structure is an additional reason for discarding the first 3 concepts I suggested, which were simply activities that could be implemented in the library. In contrast, the fourth concept is more coherent with the theory of electracy because it suggests a change in the way things are currently done and in the way children are currently engaged at the library, by introducing a new role for librarians and a way for children to use books.

One learning outcome that I had during this project was about the use of a new term with people who are not familiarized with it. Dunkels refers to today’s children and adults, regarding their initial approach to the digital world, as ‘digital natives’ and ‘digital immigrants’ (2007). This difference in the moment in which digital technology is introduced into someone’s life can explain a lack of understanding and increase in fears towards it because it is easier to interact with something that became familiar to us as children. In a similar manner, I discovered that the term electracy was difficult to approach with the people involved in the project without an academic interest. The abstract and wide aspects of this theory resulted in a lack of interest towards the term amongst the librarians and Unsworn. To address this, the Lego blocks tower activity that I created during Workshop 2 helped me ask a main question about this theory to the librarians and understand that we shared a similar understanding about why electracy is important without mentioning the term.

Through the practical approach I used during my method, I was able to understand why electracy is important when designing for children. In my first hypothesis, I aimed to find a screen-less approach to help children understand technology, increasing digital literacy levels and reducing risks. As my project evolved, I studied theories that helped me prove that keeping children away from screens and technology would be counterproductive. Instead, teachers, parents, librarian, pedagogists, designers and anyone else working with/for children should be familiarized with technology and encouraged to learn together with them (Enochsson, 2001; Whitebread & Bingham, 2013; Rosin, 2014).

One of the challenges of the project was to increase digital literacy levels for children. Through the academic papers I read regarding parents, children and technology, I discovered that in order to achieve better digital literacy levels in children, it is also crucial to change the roles of adults. It is important to view design projects for children from an electrate perspective because technology can empower children to use new tools in a positive way if it is used with proper guidance from adults (Erstad, 2003). Even though Erstad writes about fears of parents that he discovered in his research, his definition of electracy only includes changing the roles of students. In research about design for children, I suggest that the theory of electracy should also include new roles for adults.

Based on the theories I studied and on the discoveries from my design process, I define electracy for children as the set of skills that enable a child to read, understand, interpret, produce and edit visual and digital information through
technology, and enable the adults in the child’s environment to guide them properly to use these skills responsibly. It also includes the ability to adapt as technological tools advance, while supporting changes in the structure of the child’s environment necessary to adapt to the new technologies.

I conclude that it is important to incorporate the theory of electracy to interaction design studies because it offers a new perspective and elements to consider when designing a concept. I encourage other designers developing interaction design projects for children to think of the new roles for children and adults. The technologies used to solve a challenge should be friendly for children to use and understand, but also accessible for parents to understand and provide proper guidance, without interfering in the children’s exploration and without showing fear towards the new tools. When designing for an institution, it is important to think of the structure of the place and whether it supports a new design and its technologies or whether it must be changed. For an institution to support the introduction of a new design, it is important to study the way things were done previously and the current roles of the people working and attending the institution. The participatory design workshops set by Unsworn helped me understand the current setting and roles at the library for children and to incorporate changes to the librarians’ roles through the system I designed.

Regarding the 3 new roles for children, I encourage designers to evaluate their designs based on these 3 roles when designing for play or learning environments. For children from 5 to 8 years old, the first role of the self-player should not be a priority. However, I recommend to evaluate whether a particular design gives children the freedom to be creative and to decide as much as possible about the way in which they will engage in an activity.

Children are natural explorers, they have a great imagination and ability to achieve complex tasks (Druin, 1996). Rather than giving them instructions about every step to follow to accomplish a result desired by adults, it is important to consider children’s different learning abilities to guide them to understand new tools and give them the freedom to explore in their own terms. Natural learning can allow children to discover a new tool without any previous instruction.

In cases where tools and systems are more complex, as in the case of the *Little Researchers Adventure*, learning by imitation and collaboration are innate ways of learning that help children learn from others without pressure or instructed actions (Whitebread & Bingham, 2013). These learning types also support both shy and dominant or action-oriented and observation-oriented children to engage together in activities, respecting their different personalities (Harvard, personal communication, 2014).

Inductive learning is how children categorize the new items they learn (Whitebread & Bingham, 2013). When children create an element for a story through the system I designed, they will use this type of learning as they do visual research on books and collect similar elements into mental categories, such as eyes or mouths in the example of the monster. Thanks to my previous research about this type of learning, I speculated that collecting sources would be natural for children, regardless of the complexity level it suggested. I was later able to corroborate this speculation during the workshop with children, where they all understood the tasks I gave them easily and were able to create interesting characters, regardless of the time limitation and high complexity of skills required.

I encourage designers to study different learning types for children in their target age groups in order to allow their concepts to be as natural as possible for children, making them feel challenged but not frustrated. This will make the designs more engaging and it will help support the first role of electracy, even if it is not a priority.

The second role of electracy focuses on involving children in play experiences as collaborative players. Many researchers have written about different aspects of the importance of children collaborating with each other and with adults during play and learning (Damon, 1984; Teasley, 1997; Enochsson, 2001; Erstad 2003; Fawcett & Garton, 2005; Dunkels, 2007; Hemphill and Scheinholtz, 2009; Drotner, 2011; Whitebread & Bingham, 2013; de Valk et al., 2013; Rosin, 2014; Harvard,
personal communication, 2014). My knowledge contribution about this role is not to add reasons of why it is important that children collaborate, but rather that designers consider collaborative aspects of their designs when developing concepts for children through technology, and ways in which stimulating collaboration can support changes to the roles of adults and changes to the structure of institutions.

The third electracy role for children is the one of media producers. Giving children the necessary tools to produce and edit their own media is basic for the changes in communication that we are facing in the electracy era. New opportunities for self-expression, learning and communication are available for children thanks to technology (Whitebread & Bingham, 2013). The structure of institutions is changing by allowing everyone involved to express opinions and interests through social media, in increasingly visual and digital shapes. Children should have real possibilities of influencing the system and participating in the development of new institutions. My concept supports children’s development of visual and digital literacy skills, empowering them to express themselves in new ways.

Regarding my choices of academic topics, I believe that starting from a non-screen based approach had a strong influence on my concepts, as I was able to add elements that allow children to use different senses and explore in an embodied way (Michelis et al., 2006; Marco et al., 2009; Gustafson, 2012). By studying alternative interfaces, I took a strong interest in open-ended play and therefore focused firstly on the first role of electracy before discarding it as an unimportant one for children between 5 and 8 years old. These explorations were important to make that decision. For future research about children within this age group, I suggest focusing on theories to support the second and third roles of electracy, by expanding the knowledge about collaboration in connection to media production.

Regarding collaboration with a company during a thesis project, I learned a lot from Unsworn mostly because of the limitations I had during the workshops planned by them. I had to find different ways to gather answers from the librarians relevant to my concept without interfering with Unsworn’s creative process. In addition, Unworn supported me in the development of my activities for each workshop and I learned to reflect on the participatory characteristics of each activity, meaning that they should not lead the librarians to answering what I speculated but rather giving them the space to express themselves freely according to their challenges. Throughout the project, I received a lot of guidance, feedback and support from Unsworn, even for my activities that were not connected to their exploration.

Based on my previous experience with children, the workshop I organized and the research I did about play, I decided to approach my research question and the 3 roles of electracy for small children through storytelling. Children’s natural play is often based on narrative. They develop stories by taking elements from their imagination and from the tools available during play (Harvard & Lövind 2003). Books in libraries can be used as sources of inspiration for children inventing their own stories. My concept provides them the necessary tools to take these sources and turn them into their own creations, stimulating children’s creativity.

My knowledge contribution is the introduction of the term electracy to the field of interaction design for small children. My research includes the theoretical transformation of new learning roles for school students that electracy implies into playing roles for children from 5 to 8 years old in playing environments, and the creation of new roles for adults in children’s environments. With this thesis, I encourage designers to consider these elements, as well as the changes in structure for the spaces they are designing for. In addition, I contribute with the development of a concept that takes the challenges of one library and offers a solution to several of them in one same system through storytelling and the use of digital and analogue tools. I hope that in the future, the Little Researchers Adventure will be further tested as well as implemented, and that this thesis will help other libraries and institutions redesign their structures to fit the new playing roles of small children.
8. REFERENCES

### 9. APPENDIX

#### 9.1 Appendix 1 – List of general challenges for the Lilla Slottet project

<table>
<thead>
<tr>
<th>LIST OF GENERAL CHALLENGES</th>
<th>APPROACHED BY FINAL CONCEPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Creating a calm and quiet space that allows movement and sounds</td>
<td>✔</td>
</tr>
<tr>
<td>• Supporting quiet educational games</td>
<td>✔</td>
</tr>
<tr>
<td>• Creating features that focus on play</td>
<td>✔</td>
</tr>
<tr>
<td>• Encouraging different types of play</td>
<td>✔</td>
</tr>
<tr>
<td>• Helping children influence the library and leave a mark</td>
<td>✔</td>
</tr>
<tr>
<td>• Creating different and spontaneous activities that are constantly changing to make the library dynamic</td>
<td>✔</td>
</tr>
<tr>
<td>• Creating self-sufficient activities</td>
<td>✔</td>
</tr>
<tr>
<td>• Creating activities that have increasing levels to keep children engaged during all their visits throughout the years</td>
<td>✔</td>
</tr>
<tr>
<td>• Helping both shy and dominant children participate</td>
<td>✔</td>
</tr>
<tr>
<td>• Supporting children from different cultures</td>
<td>✔</td>
</tr>
<tr>
<td>• Sharing children’s different cultures</td>
<td>✔</td>
</tr>
<tr>
<td>• Giving children a feeling of belonging, making them feel this is their space</td>
<td>✔</td>
</tr>
<tr>
<td>• Reaching children that do not currently attend the library</td>
<td>✔</td>
</tr>
<tr>
<td>• Visibly supporting the 170 different existing languages in Malmö</td>
<td>✔</td>
</tr>
<tr>
<td>• Fight the latest negative results from the PISA exam</td>
<td>✔</td>
</tr>
<tr>
<td>• Attracting children between 5 to 8 years old</td>
<td>✔</td>
</tr>
<tr>
<td>• Connecting the outdoor environment with the Lilla Slottet</td>
<td>✔</td>
</tr>
<tr>
<td>• Helping parents participate in the activities</td>
<td>✔</td>
</tr>
<tr>
<td>• Helping parents have a positive experience at the library</td>
<td>✔</td>
</tr>
<tr>
<td>• Expanding the library’s possibilities through spontaneity</td>
<td>✔</td>
</tr>
</tbody>
</table>

#### 9.2 Appendix 2 – List of digital challenges for the Lilla Slottet project

<table>
<thead>
<tr>
<th>LIST OF DIGITAL CHALLENGES</th>
<th>APPROACHED BY FINAL CONCEPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increasing digital literacy levels</td>
<td>✔</td>
</tr>
<tr>
<td>• Using digital material as a democratic tool</td>
<td>✔</td>
</tr>
<tr>
<td>• Teaching children to interpret images and digital material</td>
<td>✔</td>
</tr>
<tr>
<td>• Supporting creative workshops with digital tools</td>
<td>✔</td>
</tr>
<tr>
<td>• Providing self-instructed digital activities</td>
<td>✔</td>
</tr>
<tr>
<td>• Building robust and long-lasting materials for children</td>
<td>✔</td>
</tr>
<tr>
<td>• Including Maker Spaces</td>
<td>✔</td>
</tr>
<tr>
<td>• Incrementing interest in natural sciences</td>
<td>✔</td>
</tr>
<tr>
<td>• Making more use of sound</td>
<td>✔</td>
</tr>
<tr>
<td>• Encouraging children to create together</td>
<td>✔</td>
</tr>
<tr>
<td>• Supporting the never-ending need for storytelling</td>
<td>✔</td>
</tr>
<tr>
<td>• Training and supporting the library staff to work with digital tools</td>
<td>✔</td>
</tr>
<tr>
<td>• Helping people who do not usually have access to technology learn faster</td>
<td>✔</td>
</tr>
<tr>
<td>• Supporting short and long play periods</td>
<td>✔</td>
</tr>
<tr>
<td>• Supporting children to socialize and meet</td>
<td>✔</td>
</tr>
</tbody>
</table>
9.3 Appendix 3 – Questions for Participatory Survey in Workshop 1

1. How confident are you with the usage of touchscreen devices?
   I know what I’m doing! <------------------------------------> What is this?

2. Are you a parent?
   Yes <------------------------------------> No

   Questions only for the ones who said yes:
3. Do you have children between 5 and 8 years old?
   Yes <------------------------------------> No

   Questions only for the ones who said yes:
4. How advanced are your children’s skills with touchscreen devices?
   I know what I’m doing! <------------------------------------> What is this?

5. Do you restrict your children's use of screens?
   Yes <------------------------------------> No

   Questions again for everyone:
6. In your opinion, how advanced are children’s skills between 5 and 8 years old with touchscreen devices in Malmö?
   I know what I’m doing! <------------------------------------> What is this?
7. At what age do you think children should start using touchscreen devices?
   
   0 years old <----------------------> 12 years old

8. How do you view children-screen relationship at a young age?
   
   Advantage <----------------------> Risk

9. What is more important that children do at the library to improve their reading and digital skills?
   
   Socialize with Adults <----------------------> Other children
   
   Peaceful <----------------------> Active activities
   
   Education <----------------------> Play outcome
   
   Analogue <----------------------> Digital tools
   
   Self-directed <----------------------> Instructed activities
10. Draw important learning skills for children and prioritize them for the library

1. Fun and diversity
2. Socializing and Networking
3. Interacting with devices, expressing themselves through images and different materials, speaking, reading and writing
4. Physical activity

11. Draw one object that represents digital for you

12. Prioritize the importance of learning the following digital tools for children

1. Educational electronic kits (programming skills), producing/editing their own media, app/web browsing, computer, tablet, smartphone
2. Social media, projector
3. Video games, interacting with toys with sensors, tv

9.4 Appendix 4 – Results from Online Survey for Parents

1. How many children do you have and how old are they?
2: 5 and 7 years 2 children, 5 and 3 years old 2 children, 2 month and 2,5 years 1 child, 7 years old 2 1.5 years 2, 7 and 17 Two, 5 and 8 years old 1 10 years 2 children, 3 and 7 years old 1: 2 år One, she is 7 years old One 7yrs One child, 7 years. 5years 7years We have 2, age 5 and 7 1, she is 2 years one child. 3 months Age 14,11 and 7 three children 8, 10 an 12 years old 3 children ages 1,7,10 2 st, 7, 9 år Two, 6 and 8 One 12-year old. one child, 8 years old. 2 8 and 11 y.o 1 boy who is 5 month old 3 0, 3 and 4 years old

2. How confident are you with the use of touchscreen devices?
(1 is not confident, 5 is very confident)

<p>| | | | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>1</td>
<td>0</td>
<td>0%</td>
<td></td>
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<tr>
<td>2</td>
<td>0</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>31%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>17</td>
<td>59%</td>
<td></td>
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</tbody>
</table>

3. In your opinion, how advanced are your children’s skills with touchscreen devices?
(1 is not confident, 5 is very confident)

<p>| | | | | |</p>
<table>
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<tbody>
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<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>1</td>
<td>4</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>10%</td>
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</tr>
<tr>
<td>3</td>
<td>2</td>
<td>7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>45%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>24%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Do you restrict your children’s use of screens?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>18</td>
<td>62%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>9</td>
<td>31%</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>7%</td>
</tr>
</tbody>
</table>

5. Briefly explain which rules/restrictions do you have for your children’s use of screens?

Time limits:

- Limits regarding photo uploads
- Talks about what is appropriate
- One hour a day
- Seven days a week
- Maximum 30 minutes a day.
- After dinner and homework are done.

No TV or iPad

춰야 합니다.

- Only one media at a time
- Use it with many breaks
- Maximum 30 minutes a day.

Maximum 1 hour screen time during workdays, one day/week screen free.

More flexible in the weekends.

No long Not in the morning, before school.

No violent games

No screens close to bedtime.

No internet just children’s games.

Try to restrict to max 1.5 h/day including everything.

Sometimes (when travelling, illness and other situations) get more time...

We let our oldest child watch film on the computer some times when he is ill or tired.

We do not have TV or iPad, and won’t let him use our smartphones.

1 hour a day on weekdays

Double time outdoor-play than screen-time, but it depends what screen activity it is.

Not too much.... the iPad is not visible at home so it has to be asked for never more than TV an hour, iPad 20 min, not every day.

Maximum 30 minutes a day.

Tv, after dinner and homeworks are done.

Dom får låna en iPad, det är inte deras.

Only media at a time and use it with many breaks (20min) but its hard to comply with these rules.

No use at all cause they are still too young.

TV is a way for them to calm down after school, but max 30 min because we will have dinner, pyjamas, read before going to bed etc.

During weekends they can watch but not addicted, we do a lot together.

Do not have smart phones.

Try to restrict to max 1,5 h/day including 1 hour a day.

Weekends 2 hours.

No explicit rules, except not at the dinner table.

We let our oldest child watch TV about an hour/day.

7. At what age do you think children should have their own touchscreen device?

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 5 years</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>5 - 8 years old</td>
<td>5</td>
<td>17%</td>
</tr>
<tr>
<td>8 - 11 years old</td>
<td>15</td>
<td>52%</td>
</tr>
<tr>
<td>12 or older</td>
<td>8</td>
<td>28%</td>
</tr>
</tbody>
</table>
8. How do you view the children-screen relationship at a young age?
(1 is risk for children, 5 is advantage for children)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>7%</td>
<td>10%</td>
<td>34%</td>
<td>41%</td>
<td>7%</td>
</tr>
</tbody>
</table>

9. Describe the main advantages you believe technology offers children
Flexibility, learn how to decide what’s important, problem solving, logical thinking, good writing and reading skills, global interaction (empathy for and knowledge about people (differences and similarities) all around the world). Framtiden kommer bara bli mer och mer teknisk Depends on what they are doing, what kind of programme or game! We adults need to guide them there. There is a lot of pressure from friends and advertisement. They learn so much at an early age, which is harder when you get older. My 2 year old shows her grandmother how to use the ipad. Games with puzzles, numbers and letters are very educating, if there are acts that can not be made IRL it is an advantage. Language learning for example they develop new techniques of communications Ive seen some games that are really smart for kids some of them are interactive (minion game) Entertainment Media literacy, great for learning They like teh touch screen, it is easy to use and if used with educative programs etc. they really learn a lot and fast. Learn how to handle technology Read Problem solving learning interacting with media and others. Easy access to information. Making learning fun and interesting. Gamification/graphical interfaces to learning resources can perhaps be good for otherwise uninspired children Gives them a tool that is necessary to know well in our time. May stimulate them in new ways. Technical confidence Logical thinking Development of language The learning advantage at young ages makes it perfect for kids to adopt to different technology. I do prefer their use och touch pads because it makes kids interactive instead of passively viewing tv. Fast information. Possibilities to try many new and different things/interests. Creativity. Access to a vast amount of different learning programs makes it more easy to find something that fits them. Makes learning a bit more fun and interactive. Also the fact that the future will contain more and more interaction with technical devices in many different daily situations makes "know-how" about them important. Tablets, computers and IT in general will be a big part of their life in the future, regardless of their career choice. It will be a big part of their interaction with the world in the future, and something parents should actively teach their kids, not just restrict them. Instead, show kids how to be safe, critical, and balanced. It is a great way for kids to discover new things, to be creative, to have fun, and to keep in touch with people far away. They can get to know things I am unable to show them. Knowledge, information. Det är lärorikt också, han lär sig mycket engelska och färger, alfabet, räkna etc. Language, puzzles, math games, technology.

10. Describe the main risks you believe children face because of technology
Eye problems, abusive use without parents control can lead to a need thats not real. Dom måste leka på riktig oxå They get addicted, very hard to communicate, agressive! We face these kind of behaviour despite restrictions. Bad physical ability. To much information and constant brain activity. That they stop playing on their own or together with other children and loose themselves into technology and the virtual world. They don’t understand the real world because their references are virtual where everything is easy and happens without any struggle or difficulties. Simplicity. Wrong information. Addiction, isolation, cyber mobbing They don’t discover the world by theirsellf It should never replace playing with friends in real life. Smartphones, as example, should not be allowed within the school premises during school hours. Photos and information can be shared in an instant to a huge number of people online and children are not aware of the consequence. Also kids getting inactive could be a problem. A new syndrom has been discovered among young children, as example: Face-down-syndrome. These are kids that has severe neck problems because they have been staring down on a tablet for many hours every day. It will happen what happened to me: addiction! Too much screen time, too littel physical activity, if time not restricted. Develope addiction See violence The main risk I think it’s when children are alone with the screen, when the parents stop caring and talking to their child. When the children do not get any or very little human interaction. the inability or scare of constructing things with real paper for example, not being used to paper and pen as “first” tool, getting things served on an iPad makes them pacified and fantasy restricted because there is always an easy way to be entertained just a click away, you need to sit still when using the iPad e.g. no exercise and "motorist träning", Eyes Bullying Misuse Harder for kids to develop social skills face to face and their physical skills Sometimes it seems like they loose their emagation, If they are not aloud to play with Phoenix or ipad, they have nothing to do. Putting themselves in danger, being exposed to bullying, prioritizing it over other important activities Isolation, lack of friends IRL, not being outdoors enough, not using their body enough in their everyday life (lack of everyday activity!) Stress-related health issues. Physical problems in the neck and back due to leaning over smart phone/iPad for long periods of time To much time sitting still Stillisattande, asocialt, överstimulerande för de minsta. Min tvååring tappar
intesset för böcker när han har tillgång till en skärm och jag tycker att det är bättre att läsa tillsammans än att parkera honom framför en skärm. Han blir övertrött efter en stund. För många snabba intrtyck för en tvååring.

11. How often do you and your children play/learn something together with a touchscreen device?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>Once a month</td>
<td>7</td>
<td>24%</td>
</tr>
<tr>
<td>Once a week</td>
<td>13</td>
<td>45%</td>
</tr>
<tr>
<td>Daily</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>10%</td>
</tr>
</tbody>
</table>

9.5 Appendix 5 – Interview by the librarians of children attending the library

Intervju 1:
Älder: 5 år (fyller snart 6 år)
Bor i stadsdel: I Löddeköping
Favoritkaraktär i böcker/film/spel? Bamse
Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det)
Surfplatta
Vad gör du på den? (Håll öronen öppna för ev. produktion)
(om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)
Spelar massa olika spel, Krokodilspel, godisspel, fruktspel, Candycrush, Radioapan
Favoritapp? Ett spel med en groda
Favoritspel? (Vilken typ av konsol är det?) Ett spel med en groda(app)
Favoritpyssel? Färger, snören, glitter, allt som glänser...
Största hobby? (finns det en hookpotential?) Rita, pärla, titta i bok, plocka blommor. Kunde mycket om blommor, olika namn etc.
Vad gör dig glad? Cirkus(hade nyss varit på cirkus)
Vad gör dig arg? När personer bråkar med henne eller slåss
Vad gör dig rädd? Mardrömmar. (men då hade hon värsta bra knepet där man helt enkelt försvinner till ett annat land där det bara finns bra mardrömmar:)
Vad gör dig ledsen? När kompisar inte vill vara vän med än.
Vad vill du bli när du blir stor? Prinsessa (vad hon skulle hitta på när hon var prinsessa hade hon inte riktigt tänkt ut än)
Vad heter din bästa kompis? Isabella för att hon kommer på bra idéer, bättre än hennes egna. Roliga lekar tex..
Vad gör du med dina kompisar när ni leker? Legogrejer, pyssel, ritar.
Vad hade du velat göra på bibliotek om du fick välja själv? Rita på svarta tavlan(dvs. nuvarande Önskeväggen)

Intervju 2:
Älder: Ett tvillingpar där både precis nyss fyllt 9 år. ( en kille och en tjej, tjejen avviker efter halva intervjun)
Bor i stadsdel: Möllevången
Favoritkaraktär i böcker/film/spel? Asch( i filmen Evil Dead) som han bara får se med pappa. Som för övrigt är hans stora idol! Systerns favoritkaraktär är hon i filmen Violetta (oklart vad karaktären heter)
Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det)
Ipad som de delar
Vad gör du på den? (Håll öronen öppna för ev. produktion)
(om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)
Båda använder barnkanalen. Han spelar mkt. Systern tittar mer på filmer. Men berättade att hon även gjorde egna filmer som hon skickade till kompisar, lite oklart hur det gick till. Hon hade gjort nån om tuffa saker...som hon hade skickat till sin kusin.
Systern avviker. Tvillingbrorsan kvar.
Favoritapp? Spelar starwars, oklart hur och var?
Favoritspel? (Vilken typ av konsol är det?)
Favoritpyssel?
Största hobby? (finns det en hookpotential?)
Träna ju jutus fast mest spel av olika de slag.
Vad gör dig glad? När han ställde upp i melodifestivalen på skolan och sjöng låten Kåra bröder. Då grät fröknarna och han fick massa beröm av kompisar, då blev han superglad.:)
Vad gör dig arg? När andra retar hans bästis, tex när de fällde hans kompis i fotbollen.
Vad gör dig rädd?
Vad gör dig glad?
Största hobby?
(finns det en geekpotential?)
leka med lego
Favoritpyssel?
Favoritspel?
(Vilken typ av konsol är det?)
nej
Favoritapp?
nej
(om barnen tar bilder/filmer
Vad gör du på den?
(Håll öronen öppna för ev. produktion)
(om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)
Spela
Favoritpyssel? (Vilken typ av konsol är det?) Playstation.
Favoritkaraktär i böcker/film/spel?
Största hobby? (finns det en geekpotential?)
Spela spel verkar vara grejen. mamman inflikar att han ju fick en sparkcykel också som han väl använder:
Vad gör dig glad? När han får presententer (har nyss fått en stor läda med kakor innan bibblan, då blev han superglad.
Vad gör dig arg? När han inte får köpa de spel han vill ha (som nyss då han hade velat köpa ett spel på bibblan, får nu reda på att man inte kan köpa spel på bibblan)
Vad gör dig rädd?
Vad gör dig glad?
Vad vill du bli när du blir stor? Polis
Vad gör du med dina kompisar när ni leker? de träffas därför mest på helgen, får inte klarhet i vad de gör, massa saker är svaret.....
Vad hade du velat göra på biblioteket om du fick välja själv? Spela wii, (men det får han inte för mamman)

Intervju 3:
Ålder: 6 år
Bor i stadsdel: Kirseberg
Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det)
Iphone som han får låna av mamma ibland. verkar vara begränsad tid.
Vad gör du på den? (Håll öronen öppna för ev. produktion)
(om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)
Spela
Favoritapp?
Favoritpyssel?
(loga och mysas
fika

Intervju 4:
Ålder: 10 (pratar mycket lite svenska)
Bor i stadsdel: vet inte (malmö)
Favoritkaraktär i böcker/film/spel? ingen (Zlatan efter förslag från intervjuren)
Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det) nej
Vad gör du på den? (Håll öronen öppna för ev. produktion)-
(om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)
Favoritapp? nej
Favoritspel? (Vilken typ av konsol är det?) nej
Favoritpyssel? -
Största hobby? (finns det en geekpotential?) leka med lego
Vad gör dig glad? att kittlas
Vad gör dig arg?

Intervju 5:
Ålder: 6,5 år
Bor i stadsdel: Norr
Favoritkaraktär i böcker/film/spel? Pinkie Pie (My little pony = MLP)
Har du tillgång till Smartphone och läsplatta?
Egen mini ipad och använder mamma och pappas iPhones
Vad hade du velat göra på biblioteket om du fick välja själv? vet inte

Intervju 6:
Ålder: 6
Bor i stadsdel: Centrum
Favoritkaraktär i böcker/film/spel? Många olika! Till exempel LasseMaja, Pippi
Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det) Ja
Vad gör du på den? (Håll öronen öppna för ev. produktion) spelar, tittar på film
Vad gör du med dina kompisar när ni leker? Iblind gungar vi. Ibland leker vi MLP. Ibland ritar vi.

Intervju 7:
Ålder: 8
Bor i stadsdel: Centrum
Favoritkaraktär i böcker/film/spel? Lånaren Arietty(Japansk animerad film)
Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det) Ja
Vad gör du på den? (Håll öronen öppna för ev. produktion) Tittar på film (om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)

Favoritapp? Minecraft
Favoritspel? (Vilken typ av konsol är det?) Äckliga familjen(kortspel)
Favoritpyssel? Göra olika djur
Största hobby? (finns det en geekpotential?) Dansa
Vad gör dig glad? När någon säger fina saker
Vad gör dig arg? När någon är dum
Vad gör dig rädd? Borrljud
Vad gör dig ledsen? När någon bråkar
Vad vill du bli när du blir stor? Doktor
Vad heter din bästa kompis? Har många olika
Vad gör du med dina kompisar när ni leker? Pratar, klär ut oss, leker
Vad hade du velat göra på biblioteket om du fick välja självt? Läsa, dansa, spela musik, mysja

Intervju 8:
Äldre: 8
Bor i stadsdel: Fosie
Favoritkaraktär i böcker/spel? Batman
Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det) Ja
Vad gör du på den? (Håll öronen öppna för ev. produktion) Spelar spel, ser på film (om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)

Favoritapp? Spiderman app?
Favoritpyssel? Röra
Största hobby? (finns det en geekpotential?) Spela spel
Vad gör dig glad? Leva med kompisar
Vad gör dig arg? När någon är dum
Vad gör dig rädd? När någon jagar mig
Vad gör dig ledsen? Att inte få vara med och leka
Vad vill du bli när du blir stor? Polis
Vad heter din bästa kompis? Jag har många olika kompisar!
Vad gör du med dina kompisar när ni leker? Spelar fotboll, killeboll och spelande spel(tv-spel)
Vad hade du velat göra på biblioteket om du fick välja självt? Läsa!

Intervju 9:
Äldre: 5
Bor i stadsdel: Nydala
Favoritkaraktär i böcker/spel? Batman
Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det) Ja, både iphone och ipa (ipad trasig)
Vad gör du på den? (Håll öronen öppna för ev. produktion)
(om barnen tar bilder/filmer - fråga vad de gör med dem efteråt) Spelar Minecraft
Favoritapp? Minecraft
Favoritpyssel? Lego
Största hobby? (finns det en geekpotential?) MINECRAFT!!!!
Vad gör dig glad? Mamma & pappa
Vad gör dig arg? När saker går sönder
Vad gör dig rädd? Drömmar, när mina föräldrar förvandlas till spöken
Vad gör dig ledsen? När min bil gick sönder (Ferrari) och jag inte fick någon ny
Vad vill du bli när du blir stor? Köra flygplan och bilar, vill bygga saker
Vad heter din bästa kompis? Elias, Blarton, Manuel m.fl.
Vad gör du med dina kompisar när ni leker? Gunga, hoppa, lego, bygga
**Intervju 10:**

Ålder: 4

Bor i stadsdel: D-hall

Favoritkaraktär i böcker/film/spel: Bamse

Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det) Serverat på ett fat, allt finns

Vad gör du på den? (Håll öronen öppna för ev. produktion) (om barnen tar bilder/filmer - fråga vad de gör med dem efteråt) Tycker om att spela in sig självt/ sång

Favoritapp? Radioapan

Favoritspel? (Vilken typ av konsol är det?) Radioapan

Favoritpyssel? Klippa och klister

Största hobby? (finns det en geekpotential?) Blommor, klar geekigt när man är fyra :)

Vad gör du glad? Gunga

Vad gör du arg? När det gör ont

Vad gör du ledsen? Såpbubblor i ögonen

Vad vill du bli när du blir stor? Läsa böcker, Leka med kompisar

Vad hade du velat göra på biblioteket om du fick välja självt? Läsa böcker

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**Intervju 11:**

Ålder: 8 år

Bor i stadsdel: Centrum

Favoritkaraktär i böcker/film/spel: Sigge i Siggeböckerna, Ronja Rövardotter

Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det) Ja

Vad gör du på den? (Håll öronen öppna för ev. produktion) Spelar spel, tar bilder (om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)

Favoritapp? Barnkanalen

Favoritspel? (Vilken typ av konsol är det?)

Favoritpyssel? Rita Göra smycken

Största hobby? (finns det en geekpotential?) Dansa balett

Vad gör dig glad? Läsa böcker, Leka med kompisar

Vad gör dig arg? När andra barn väsas och leker med för mycket oväsen och när andra barn är dumma Blir också arg när inte mamma har tid att vara med mig och läsa eller leka

Vad gör dig rädd? Att bli lämnad ensam hemma eller när det är för mörkt

Vad gör dig ledsen? När andra barn är dumma

Vad vill du bli när du blir stor? Lärare och mamma

Vad heter din bästa kompis? Sara

Vad gör du med dina kompisar när ni leker? Lägger pussel

Vad hade du velat göra på biblioteket om du fick välja självt? Läsa böcker i en mysig hörna där inga små barn stör som nu

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**Intervju 12:**

Ålder: 8

Bor i stadsdel: Centrum

Favoritkaraktär i böcker/film/spel: LasseMaja böckerna, Pelle svanslös filmen

Har du tillgång till Smartphone och läsplatta?(observera att många barn kallar alla smartphones för iPhone så det kan vara bra att säga det) Ja

Vad gör du på den? (Håll öronen öppna för ev. produktion) Spelar spel (om barnen tar bilder/filmer - fråga vad de gör med dem efteråt)

Favoritapp? ?

Favoritspel? (Vilken typ av konsol är det?) ?

Favoritpyssel? Göra fina kort, måla, göra fina tavlor av plastpluppar som man sen värmer med stryjkjärn

Största hobby? (finns det en geekpotential?) Dansa

Vad gör dig glad? Gå i skolan

Vad gör dig arg? När pojkarna inte gör som fröken säger

Vad gör dig rädd? Om det blir krig
Children will be divided in 4 teams. Each group will choose a role for the character they will invent for a story, which will take place in the magic forest. Here are some suggestions if they do not know what to choose:

- Hero/Heroin
- Dragon
- Witch
- Villain
- Prince/Princess
- Different animals

The task for group 1 is to collect different body parts for their characters from different books and then build a character by putting the parts together.

Children will receive transparent papers to collect different body parts that they like for their character from different books. The librarian will help the children find the right books. The children will draw the body parts they like using the transparent paper and pencils.

The children will receive one big white paper where they can build their characters. They will cut the parts they chose to use for their characters and glue them together on the big paper. They can then color the character and draw parts missing. If there is time left, children can think of the story of their characters.

Children will be divided in 4 teams. Each group will choose a role for the character they will invent, which will take place in the future, where characters live inside iPhones. Here are some suggestions if they do not know what to choose:

- Superhero/Superheroine
- Robot
- Monster
- Alien
- Boy/Girl
- Mutant animals

Each team will receive an iPhone costume with a set of body parts. One child will wear the costume, while the other team members build a character on it. The children will select the body parts that best suit their character and glue them together on the cardboard iPhone’s screen. They can also draw missing parts.
Every 10 minutes, a different child will wear the costume. This will allow all children in the team to create the character and to wear the iPhone.

9.40 – Child 1 wears the costume
9.50 – Child 2 wears the costume
10.10 – Child 3 wears the costume

If there is time left, children can think of the story of their characters.

10.15 – Children tell their stories

We will go to the storytelling space inside the bookshelf. Children will tell the others the story of their characters. Because of the limited time for the workshop, children will not have much time before to elaborate on the stories. During these short presentations, the adults can help children by asking them questions. Here are some suggestions:

- Does the character have a name?
- Does the character have any special abilities?
- What is the relationship of your character to the other 3 characters in your setting? Is the character good/evil with others?

10.30 End of the workshop