Pedagogical Toolkit
How the value of repair can be increased through resilience

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Abstract

In today’s society we buy, use and throw things away which has made waste an environmental problem which affects our planet negatively. To prevent further development of consumerism, sustainable movements must be made where society must climb up the ladder of waste hierarchy and start to integrate in preventing the production of waste. One way to manage and prevent waste is through changed consumer practices that encourage repair. As it seems the discussion about repair is a missing part in the Swedish structure about waste management. It is not a part of what children are being taught and it is not a part of the ongoing discussion about environmental issues. The purpose with this thesis is to plant a seed of change among children and bring back the mindset where humanity integrate with the planet. The research question for this thesis is: “how can the value of repair be increased through resilience among children who are the future influencers?” Through my research and methodology I decided to design a prototype of a pedagogical toolkit for kindergarten consisting of storytelling through a book and an interactive product. As a part of the design process, a workshop was performed where the core concept of my toolkit was tried out at a kindergarten. The workshop resulted in good management from the children of the content of the story and the interactive product. A pluralistic discussion about how they could help the main character Julia with the broken chair in relation to waste management occurred. The children were “nudged” through the story in the decision making towards repair, which was the option they choosed. The prototype of my toolkit might not at this stage have resulted in actual increased knowledge about waste hierarchy and prevention of waste. However, according to my opinionen it has contributed to an increased discussion about repair at the local place where I had my workshop. Hopefully the toolkit has started a thinking process in those children’s mindset and something new within the pedagogical aspects as regards sustainability and waste management. The value of repair can be increased through a pedagogical toolkit consisting of storytelling and an interactive part. Through my prototype of the toolkit a discussion about repair at local level has started. How this project will be developed will be left to the unknown and future explorations of the matter.
Keywords

- Sustainability
- Waste management
- Repair
- Sustainable education
- Children pedagogical toolkit

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1 Introduction

1.1 Background and problem description

The demand and the availability of materials, where we buy, use and throw things away in a much larger amount, has made waste an environmental problem in society. Mountains of “waste” are growing larger which affects our planet negatively.¹ To prevent further development of a society trapped by consumerism, sustainable movements must be made. In Sweden, recycling areas have been created and are well integrated in many of the personal homes and work-places. The perspective of reuse is also well integrated through for example second-hand shops. These are two of the five steps which can be found in the European waste hierarchy, relating to waste management². If a sustainable movement shall be made in the long-run, I as an agent of change believe that society must climb up the waste hierarchy (further explanation in section 2.1) and start to integrate in prevention of producing more waste³. Waste prevention can include different types of design and practices, where the creation of waste is being prevented. One path to walk down, is the design for consumer practices that encourage repair and maintenance.⁴ Some existing social movements which can be mentioned as examples are “repair manifestos” and “repair cafés”⁵. The manifestos stipulates arguments for why things should be repaired such as:

- Repair is better than recycling – making things last longer is more efficient and more cost-effective than mining them for raw material.
- Doing the repair yourself saves money
- Repair teaches engineering
- Repair saves the planet if we use what we already have.
- Repair connect people and things.⁶

¹ Hultman, Johan, Hervé, Corvellec, The European waste hierarchy: from the sociomateriality of waste to a politics of consumption, 2012, Lund University, p. 2413.
⁴ Hultman and Hervé, The European waste hierarchy: from the sociomateriality of waste to a politics of consumption, p. 2414.
⁵ Repair café – where people meet and repair things together. Tools, material and expert volunteers with repair skills can be found at the café. A social sustainable movement from the Netherlands. https://repaircafe.org/en/about/
⁶Ifixit manifesto: https://d1ulmnr4d4i8j4.cloudfront.net/static/images/manifesto/manifesto_en_final.pdf
The social movements is all about rethinking our relation to products and the life process of the product and to see the value of repair. However, considering repairing a product also requires reflection upon if the product can be repaired but also what skills, tools and materials that is required to repair the product.\(^7\) The different arguments for why we should repair and the challenges that must be considered, plays a central part in designing consumer practices connected to waste hierarchy. Despite that there are some examples of sustainable movements connected to repair, the mindset today is mostly focused on recycling. This mindset is driven and upheld by the current generation and the grown-ups, which is understandable, since this is what they have been taught in society. However, if sustainable movements shall be made where the planet can be taken care of for the coming generations, the focus must be on the children as influencers. It is the children that have the greater stakes as citizens of the future planet and it is in the early childhood where investments are being made through education, which gives result and effect later in life\(^8\). What children are being taught and inspired by in their childhood will shape the behavior of their future actions. If we use the grown-ups as influencers and tries to change their behavior and mindset, we might get some short-term results in relation to waste management, but the coming generation will not play an active role. However, if we plant the seed of change with the children as influencers, the seed can open up and give a result at a much larger and long-lasting stage.

Linking together repair and education, an interesting question to ask, is what the children learn about repair and the value of it. In kindergarten and schools in Sweden, a visible connection to biology and educational sloyd can be found. In Swedish kindergartens, children are being taught about sharing, renting and recycling. They also learn about nature and make different craftworks out of what they find in the woods etc. There is a strong link between nature, its resources and reuse.\(^9\) However, there is no visible connection to sustainability and waste management as regards repair and the value of it. As regards biology-class in primary school, subjects such as consumption, the nutrition

\(^7\) Lara Fornano “Repairing Futures: Anticipation, Participation and Speculation” https://vimeo.com/207318286

\(^8\) European Panel on Sustainable Development, Taking children seriously – How the EU can invest in early childhood education for sustainable future, report no. 4, 2010-12-17, p.7 and 27-28.

\(^9\) Interview with kindergarten teacher Therese Källner, 180223. As regards tools, se for example the “Pettson and Findus” app about interventions and repair - https://play.google.com/store/apps/details?id=se.filimundus.pettsonsinventions&hl=sv, and the serie of books about the beaver Castor who do a lot of things such as fixing a bicycle that has been punctured - http://www.larsklinting.se/sv/books/castor.
chain, recycling, nature, the ecosystem and ecological sustainability are being taught at different levels. However, there are not any books or specific subjects about sustainability and waste management talking about repair. Slöjd (the Swedish word for handicrafts) is a compulsory subject in Sweden in years 3-9 in primary school where children are taught about handicrafts such as woodwork, metal work, and textile work. The aim of today’s syllabus is to develop the student’s creativity and strengthen their belief and their ability to manage tasks in daily life. There is also a strong link in the syllabus between learning with materials and creating sustainable development. This is further developed in the commentary document to the syllabus from Skolverket since 2011, which stipulates that years 4-6 in primary school should learn about “resource management… for example how it can be repaired and reused”. How this is being taught and achieved in the daily work is left to the teacher on an individual basis. The children do obtain some repair skills in sloyd, but according to my research there is no clear and visible connection to the value of repair and its relation to waste management.

Children are not only influenced at kindergarten and in school, but also at other places in society. According to the observations that I have done at toy stores in Växjö, there are no children toys or craft material about repair. There are toys related to building and making things such as tool boxes, material for handicrafts, etc, but nothing about repair. Even at the children’s level and in the area of play and where kids have fun, consumerism can be identified. A toy store does have its foundations in profit and sale – consumerism, but a toy for children also plays a great part of what children get influenced by in their childhood.

13 Interview with Hanna Hofverberg, 180319.
14 Observation and interview with employees (who wish to remain anonymous) at BR and Toys’rus Växjö 180218.
As it seems, the discussion about repair is a missing part in the Swedish structure about waste management. It would seem that people are aware that things can be mended, but still it is not a part of what children are being taught and it is not a part of the ongoing discussion, speaking about environmental issues. It is in this landscape and in this identified problem that I would like to intervene and where I hope to play an important role.

1.2 Purpose and research question

The overall purpose with this project is to plant a seed, to change the mindset of today’s children who are the future influencers. I will try to do this by implementing knowledge about waste management and increase the value of repair using waste hierarchy. The purpose with this project is also to open up a discussion and dialogue about repair. Through this, I will try to contribute with a change of the future management of consumerism and waste at a local level. The change of mindset, that I hope to achieve, will focus on bringing back the mindset where humanity integrate with the planet and where humans live within our planets boundaries and not out of it (resilience, see section 2.3).

The following question will be answered to achieve my purpose:

- How can the value of repair be increased through resilience among children who are the future influencers?
1.3 Delimitations
The field of research will be delimited to Växjö, Sweden, since this is where I have my collaborative kindergarten and where the majority of my observations and interviews will take place. Implementation of my design will start at kindergarten level. This thesis will focus on consumer practices connected to repair. Other approaches in the waste hierarchy will therefore not be discussed at any deeper level.

1.4 Outline
This thesis is divided into six chapters, structured as follows;

Chapter 1: introduction
Chapter 2: theoretical background
Chapter 3: methodology
Chapter 4: design process
Chapter 5: analysis and conclusion
Chapter 6: resources and literature
CHAPTER TWO
2 Theoretical background

In this chapter, I will present the theoretical framework which lays out the foundation for the facts that must be understood to follow my design process and to understand what I want to contribute with. Theory also plays an important role in the support of my design concept.

2.1 The waste hierarchy

Mountains of waste are growing bigger and the environmental impacts increases in parallel. To prevent these problems from going further the European Union has legislated a directive to strengthen the measurements which must be taken regarding waste-management. According to the directive the purpose is to introduce an approach that considers the whole life-cycle of products and materials and that focus on reducing the environmental impact of waste generation and waste management, to strengthen the economic value of waste. The directive also aims to “disassemble, circulate and reintroduce as much material as possible into production processes”. The European Union’s approach to waste management is based on the five-step waste hierarchy which ranks the desirability of different waste-management approaches according to their environmental impact. Disposal or landfilling is the least desirable option because of the many potential adverse impacts it can have. Recovery, is when the incineration of materials is combined with recovery of the energy contents of the martial for electricity and heat, followed by recycling and composting of material. This is not the most efficient way of waste-management since all types of materials cannot be burned and can therefore not be managed through this approach. Recycle, is the most common one and the approach where individuals plays an important part. Strategies about separating waste 

18 Hultman, Johan, Hervé, Corvellec, The European waste hierarchy: from the sociomateriality of waste to a politics of consumption, 2012, Lund University, p. 2413.
into different material types and transport it to recycling areas can be found in many households. Recycling is all about transformation through disassembly, sorting and circulation which allows materials to re-enter industrial and biological production processes. **Re-use**, is an approach which involves the repeated use of products and components for the same purpose of which they were convinced. **Prevention**, is the most desirable approach in the waste hierarchy. Prevention is all about changing design, production and consumption practices into an approach which do not result in the creation of waste. Examples of such designs can be elimination of spill in production but also consumer practices that encourages thrift such as repair, maintenance and second-hand retail. It is in prevention of waste, that I as a designer will try to change the consumer practice of today and create a new one for the future. This is important to keep in mind, when reading about my design process later in section 4.

2.2 The nudge theory

“Nudge” is a behavioral science and political theory presented by Richard H. Thaler and Cass R. Sunstein where choice architects try to influence people’s behavior and choices in order to make their lives longer, healthier and better. In other words, to steer people’s

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choices in directions that will improve their lives. Thaler and Sunstein describes the choice architect as someone who “has the responsibility of organizing the context in which people make decisions”. In the discussion of how nudging can be used and be successful, Thaler and Sunstein argues that the environment where decisions are being made, must be designed in a user-friendly way, by the choice architects. The nudge theory in combination with resilience (see below) supports and creates the foundation for the sustainable change that I am hoping to achieve through my design. A change of mindset, will need a behavioral change where children needs to be nudged in the decision-making between throwing things away (produce waste) or prevent waste and instead repair things (the climb at the hierarchy).

2.3 Resilience
Resilience is an approach within sustainability which can be defined as “the capacity of a system to deal with change and continue to develop”. This system can be an individual, a city, an economy or a specific place. The resilience approach is based on an idea where humans and the nature shall be seen as one social ecological system. It is all about integrating these interacting systems together, to ensure a sustainable way for humans to live within our planet’s boundaries and not outside of it. Humans has in some parts disconnected one selves from the nature, where the desire of the humans comes first. A shift and change of thinking where the knowledge of how we can strengthen the capacity to deal with the stresses caused by climate change and other environmental issues which is caused by humanity, is of great importance for saving our future planet for the coming generations. Within the field of resilience a set of seven principles has been

One principle of particular interest for my project is the principle of **encouraging learning**. To be able to adapt to changes and to enhance the resilience of a social-ecological system, it is of great importance to continually update and revise existing knowledge. Three approaches such as; adaptive management, adaptive co-management and adaptive governance all focus on how learning can be an integrated part of the decision making. It is also important to provide opportunities for interaction that enable extended engagement between participants. The social context and sufficient resources for the sharing of knowledge is also of great importance for the outcome. The core concept of resilience plays an important role in how I am planning to increase the value of repair to the children.

### 2.4 Education for sustainable development

Due to the environmental issues that are being faced now and in the future, the concept “sustainable development” has been developed. The concept originates from a moral concern for future generation. The Bruntland Comission declares that a sustainable development is:

> “a development that meets the needs of the present without comprising the ability of the future generations to meet their own needs”.

As a part of this development a concept regarding education for sustainable development (ESD) has been introduced, discussing how the coming generation can enhance the competence to participate in debates, discussions and decisions on sustainable issues. Within this research field Johan Öhman has argued for three different selective traditions within environmental education in which environmental issues can be learned. In a **fact-based tradition**, environmental issues are being treated as knowledge problems where

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only science and fact can provide a reliable foundation about environmental issues. The
democratic role, where discussions about the subject can take place, come after the
educational part. In the normative tradition, the answers to value-related issues are
established through discussions among experts and politicians on the basis of scientific
facts about environmental issues in the world. The norms from these discussions are then
presented in policy documents and within the syllabus which thereafter is being taught in
schools. Neither in this tradition is the democratic discussion included in the learning
process, since it takes place before the educational part. The third tradition, is the
pluralistic tradition. This tradition is striving to promote different perspectives, views
and values about environmental issues through deliberative discussions. In this tradition,
the democratic discussions are situated in the education itself.\textsuperscript{33} Since I will combine
design and sustainability through education, I believe it is important to connect the
content and the knowledge that I want to learn the children to some theory parts about in
what way knowledge about sustainable development can be taught. This part of the
theoretical background is therefore important to keep in mind, when reading about my
design process later on.

\textsuperscript{33} Öhman, Johan, \textit{Values and democracy in education for sustainable development – contributions from
CHAPTER THREE
3 Methodology

This section outlines the methods that I have used to connect the theoretical frameworks to the design process and my contributions as an agent of change.

3.1 Exploration

To orientate myself and find the landscape where I wanted to interact as a designer, I did a lot of exploration via internet and library (literature and digital resources). I also did some different observations and interviews in order to investigate deeper in my subject.

3.1.1 Observations and interviews during landscaping

To orientate myself in relation to my landscape I did some observations. The purpose was to identify the state of things when it comes the existing Swedish education system and the Växjö society and its relation to sustainability and waste management - particularly in relation to the subject and practice of repair. These observations took place for instance at a kindergarten in Växjö, at the library and in toy stores. Questions that I was asking myself during the observations were the following:

- Is there any connection to sustainability in the Swedish education system?
- Is there any connection to waste management in the Swedish educational system?
- What kind of educational tools exist, connected to waste management?
- Are there any toys related to waste management? If yes, in relation to what areas of waste management?

Table 3: Logo of the Kindergarten where cooperate with my project

Table 4: Materials that children play with in kindergarten

Table 5&6: Toy shops in the city, two important spot for my observation
I also did some interviews with a teacher-student, a kindergarten teacher, and employees at toy stores in Växjö (who wish to remain anonymous) to ask questions about the current state of things. The result from these observations and interviews, can be read about in section 1.1.

3.1.2 Inspirational observation (fly on the wall)
An unexpected observation occurred when I was at a friend’s house. The children in the family asked me to read a book called “Bajsboken”. The children were very eager for me to read it. While reading it, I saw the eagerness in the children’s eye of listening to this story and they learned so much from it. At this point of stage, the idea came to my mind – what if I could use storytelling in some way to increase the value of repair to the children?

3.1.3 Inspirational observations and research of children’s books
To get inspiration of how to write a story for children, I did some observations at the library, at a friend’s house, at a book store and an app called Book dash. The observations were focused on:

- How the story and a children’s books are structured – how do they begin, how do they end, frontpage, final page etc.
- How to organize the graphical parts.
I also watched a tutorial with tips of what to think about, making a children’s book\(^\text{34}\).

The result that I got from my observations and my tutorial research were for instance the amount of words per page, number of pages, structure of pages and how to create characters. At this point I realized that, making a children’s book includes many details. I am not a writer, or an expert in children’s illustrations. Therefore, I decided that designing a children’s book in a final and professional way was not a part of my design. The parts of my design which relates to the structure of a children’s book or the content will only be at prototype level to show an example within my concept of design (see section 4). Some of the parts from this research could therefore be disregarded in my process.

### 3.2 Brainstorming

Brainstorming is a method that I have been using during the whole design process. It has helped me to ideate my different parts of the design process.

\(^{34}\) [https://www.youtube.com/watch?v=A6w0ZhMiXj8](https://www.youtube.com/watch?v=A6w0ZhMiXj8), [https://feltmagnet.com/drawing/How-to-Illustrate-a-Childrens-Book](https://feltmagnet.com/drawing/How-to-Illustrate-a-Childrens-Book).
By this method I tried to plan the whole project by timing and put everything in order to have a better overview on my project. This method helped me to avoid all missing parts and upcoming work to handle.

Table 12: Brainstorming map to find the existing problem about repair

<table>
<thead>
<tr>
<th>Home (parents)</th>
<th>Kindergarten</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is different in different houses. Parents act different from each other that is why children with handy parents learn more about repair and reuse but in such a society where people act like consumerism, there is no place for repair thinking.</td>
<td>They have some activities about sustainability and Circular economy using second hand. Leave stuff to Erikahjälpen planting vegetables, working with wood.</td>
</tr>
<tr>
<td>Toy shop</td>
<td>No repair education or activities</td>
</tr>
<tr>
<td>There are lots of toys with different functionality for building and making things and also some toy equipments for children</td>
<td>No repair program for children</td>
</tr>
</tbody>
</table>

Table 13: Gantt chart (project plan)
3.4 Mapping
In order to have a better understanding about different system related to my project I did some mapping.

3.4.1 System mapping
Through this method I tried to identify my stakeholders and landscape. This method helped me to get an overview of all hypothetical relations and connections between stakeholders.
3.4.2 Pedagogical toolkit mapping

To decide the structure of my pedagogical toolkit I had to do some mapping. The genre for my toolkit was already decided before starting with the mapping – a toolkit for children since they are my primarily stakeholder. As regards the structure, I was deciding between a text, graphical or interactive book. Based on some observations I did, I decided to combine a pedagogical book and an interactive product (a small size one inside the book and a real size one to be used in class). I also had to decide what kind of interactive product and with which material it should be designed with. I had some options such as toys, clothes, technology to deal with. I omitted clothes because based on my research, this field will be taught in the future education periods to children (Slöjd). Neither technology was an option, since it somehow works against my concept of repair and practical activity that I wanted to avoid for this project. Toys was really interesting and suitable for my project to work with but I had to choose a none gender toy to avoid the gender equality which doesn’t have an important role in my project at this stage. In the end I was deciding between some of the none gender toys such as chair, table, Lego, puzzle and small kitchen toys.

![Table 16: product behavioral map](image-url)
3.5 Survey

I also prepared an online survey to understand the mindset of current teenagers who has already finished their education in Slöjd in primary school. I wanted to investigate the connection between sustainability and education and its relation to skills obtained in school. The survey had 132 participators, all students from high school level in Växjö. The result of this survey shows that the major part of the students sees no connection between their learning curriculums and sustainability (see the picture below).

![Pie chart showing survey results](image)

*Table 17: Survey question "Was there any connection between sloyd program at primary school and sustainability?"

The survey also showed that about 60.8% thinks that they learned practical skills the most at kindergarten level. This convinced me and made me decide that kindergarten is the best level for my project to start at.

![Pie chart showing survey results](image)

*Table 18: To see in which level children thinks that they learn more about practical learning I asked the following question: "Which of these abilities / skills did you learn most about in kindergarten".*
3.6 Cultural probe
I also decided to try to do cultural probe to see decisions being made by students when they decide about what to do with a broken product. First, I made some sketches of the structure of the cultural probe. I decided to design a special box with four holes on top, where three of them represented three different choices: “trash it”, “repair it” or “upcycle it”. The fourth hole had an open question “do you repair your things that break, if yes, write what”. I tried my cultural probe in primary school at first. The plan was also to try it in high school, but after the first try out at primary school level I realized that the outcome couldn’t help me in the process. Many of the answers were not reliable since many of them was rogue and some of them had no answer at all. So, I decided to leave this method behind.

3.7 Storyboard and scenario-making
This method helped me to shape my story and to identify the beginning and end of my story. During the journey I found problems and weaknesses in my story and I was struggling in implementing the three approaches of learning that Öhman argued about. I changed the storyboard several times but in the end, I found the final version.
Table 20: hand sketch of story board and ideation around pages and characters

Table 21: starting of story

Table 22: Fact based of the story about sustainability

Table 23: when the product beaks in story
Table 24: Pluralistic part of the story

Table 25: a little more fact based again about repair

Table 26: interaction part of the story

Table 27: some fact about repair problem
3.8 Sketching

During my design process sketching was one of the most helpful methods that I used in ideation such as storyboard making, prototyping etc.

3.8.1 Hand sketching

This method helped me to identify very early problems and limitations in my design. It also gave me an overview of what am I doing during the process of my design.

Table 28: hand sketch

Table 29 & 30: some ideation sketches

Table 31 & 32: designing the broken part
3.8.2 3D sketch

3D sketching in solidwork program was an extra skills which, helped me to design the 3d sketch of my final product (chair) in order to have a better understanding of cuts that I made on one of the legs.

Table 33,34,35,36 & 37: some 3D sketches of broken part.
3.9 Prototyping

I did several different types of prototypes during my design process.

*Table 38, 39, 40, 41: process of designing how to break an*
3.9.1 Storybook prototyping

In order to have an idea about how my prototype of the toolkit was going to look like and how the interactive page could work, I made a prototype of the book. This method especially helped me to identify the position of the interactive page in the book. It also opened up the discussion about security-considerations, which has to be considered working with children (see section 4.3).

3.10 The 5 W and a H method

This method has been used in the design process to describe and reflect on different parts of my design (see section 4.1 and 4.2).
CHAPTER FOUR
4 Design process

4.1 Subject of design
As a result of my methodology and my research, I decided to design a pedagogical toolkit to try to achieve my purpose. A pedagogical toolkit can be designed in many ways, in different shapes and at different levels. To narrow down my project I had to come up with a frame for my toolkit. Based on the result of my survey (see section 3.5) children learn more about practical skills in kindergarten rather than in primary school (even though they have Slöjd). Therefore, I believe that having kindergarten as a starting point for learning about the value of repair is a good idea. If children are prepared with some knowledge about the value of repair when they enter primary school and starts with Slöjd, I believe that children can have much more use of knowledge and skills that they are taught in Slöjd. I also believe that if children become aware of the purpose and the importance of repair and its relation to waste management, it might have an effect on the long-term usage of such skills later in life. As regards the shape of the toolkit, I was after some brainstorming deciding between a digital toolkit or a practical toolkit. At first, I thought that a digital toolkit would be the best option since society is moving more and more towards a digital world. However, at a second thought on how I plan to teach the children about waste management and repair I realized that I need to design something tangible where the children in a practical way can interact while they learn. I was also told in one of the interviews with my collaborative kindergarten teacher that, the best way for the children to increase the ability to understand and to learn new things is through storytelling. I decided to move forward with a tangible pedagogical toolkit, including storytelling and interactive parts.

Table 46: WH question about subject of design

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35 Interview with Therese Källner, kindergarten teacher.
4.2 Structure of the pedagogical toolkit

There are several ways to tell stories to children. It can for example be done through a storybook, a game, an app, with a toy or through oral storytelling. After some brainstorming and some more meetings with my collaborator I decided that the best choice for my pedagogical toolkit as regards the story, is to tell the story through a book. The reason for this is mainly the possibility to integrate my interactive product by connecting it to a story in a book but also because of the importance of making a connection between a child and literature at early age\(^36\). As I have described in previous sections, interaction and participation in the learning process can contribute to encourage learning, which is an important part of resilience\(^37\). A great learning experience is not always about the content but about the way it is taught\(^38\). If I am going to be able to teach the children something new and change their mindset and behavior, it could not be an ordinary story in a children’s book.\(^39\). At this point of stage, the idea came to my mind: what if the children can interact in the story by helping the character to mend something? In other words, a combination of storytelling and interaction. I did some observations of books in different toy stores and book shops. I found some books where there was an interactive part integrated in the storybook where the children can play with a miniature character or use stickers connected to the story. To twist this concept a bit further and make it a more pedagogical, I decided to connect the interactive part to a product that the teacher can use in class while working with the toolkit and the children.

4.3 The interactive part

Trying to find the interactive product for my toolkit I did some interviews with my collaborative kindergarten teacher, discussing about what to think of making a toy or an item which can be used in kindergarten. One important thing that I learned was the importance of safety when it comes to toys. I did a prototype of a children’s toy – a table

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\(^{36}\)Interview with kindergarten teacher Therese Källner. One important fact that she mentioned was how new born children get a story book as a gift to bring home, and the importance of starting to read stories for the children at early age, to develop their understanding. Based on the kindergarten teachers professional experience a book is the best option to tell a story to children in kindergarten.


\(^{38}\)Dirksen, Julie, Design for how people learn, 2016, New riders, USA, introduction part.

\(^{39}\)Compare, Dirksen, Julie, Design for how people learn, 2016, New riders, USA, p. 195f. talking about the importance of practice and feedback if new skills shall be learned.
made out of paper, where I had been thinking about the choice of material in relation to the safety issues. Discussing the prototype with the kindergarten teacher, I understood that, if the item is going to be a pedagogical tool where the kindergarten teacher will be present, there will not be a problem using other materials and designs. The teacher also mentioned that small things get lost very easily. This made me rethink about having a small size product inside the book. I decided to omit the small interactive part and only focus on the real size product. In my further work on finding a good item for my interactive part, I talked to my tutor (Stefan) who suggested that I try to find a more childish toy instead of the table, which the children can connect and relate to. After this I did some sketches of different toys (see section 3.8). During the process I also had some discussions with my supervisor (Hannah Hofverberg) about my item for the book. The result of these discussions made me hesitate if a children’s toy really was the right item for the interactive part. Different children have different relations to different toys. One child loves the doll. Another one love the cars. etc. I was thinking: What toy do I need to use to make the connection and the relation between the child and the product special for the children? I started to do some new sketches of new toys. I tried among other things, to do a car with 3d-pen printer. I also did some more observations in toy stores and in town to get further inspiration. During the process I started to rethink of why do I want to teach children about repair? Creating a new toy for the market was working against my own concept of reducing the effects of consumerism and preventing waste. Therefore, I decided to try to find an already existing product which can be reused and redesign for the purpose of my toolkit. I went to Erikshjälpen in Växjö to try to find a second-hand toy which I could redesign. I found a small children’s chair that I bought. I started to do some brainstorming of how I could re-design the chair so that it could become a pedagogical item where the children can learn about the value of repair. Based on my skills in Solid work I started to do some 3D-models and sketches of how to redesign the chair (see section 3.8.2). I came to the conclusion that I must make a function where the chair can be broken and repaired several times in order to be a sustainable design. I also did some handmade sketches and had some additional

Table 47: 3D pen prototyping

40 Interview with kindergarten teacher Therese Källner 180302 and 180307.
41 Compare the old traditional Japanese repair method Kintsugi, where broken pottery was redesigned with gold and got a new design. https://mymodernmet.com/kintsugi-kintsukuroi/
discussions with my tutor about the functionality of the chair in relation to redesign. At
the end of the process, I came to the final idea which can be described with the 5 W and
a H:

![Chair Diagram](image_url)

**Table 4.8: W&H question about final product**

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### 4.4 The story

#### 4.4.1 Character

In the design process of finding the characters for my story I got inspired by two
characters called Charlie and Lola in a tv-series. One of the episodes that I found was
about recycling. The core of the story argued in a normative way of why it is important
to recycle waste, by creating a conversation in a brother and sister relationship (Lola and
Charlie). Arguments about the existing problem with waste and the concept that the
episode wanted to induct (recycling) to the audience were presented. The presentation
of two conflicting arguments within a brother and sister relationship inspired me for my
story and my main characters. After I watched this video I went to my friend’s house one
afternoon. My friends have two children, a two-year-old boy and a four-year-old girl.
When I observed them playing, they started to argue about different matters. The little
brother did things without thinking and the big sister tried to correct and help her little

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42 Charlie and Lola, Look after your planet [https://www.youtube.com/watch?v=zCfatzF2gVuo](https://www.youtube.com/watch?v=zCfatzF2gVuo).
brother. This scenario in ordinary life in combination with the video with Charlie and Lola helped me to create my main characters for the story. Big sister Julia and her little brother Noah. To connect the story to the kindergarten environment where a natural discussion about waste management can be presented, I decided to add another character – a teacher who is responsible for talking about environmental issues and waste management in the story. This character will be a character that presents facts to the reader. I also decided to add another two characters being the main characters' friends in the same age and level. The purpose with this was to prevent the story from being completely normative and fact-based and try to add a pluralistic approach of the story. The two friends will try to lead the story to the open discussion about what Julia should do with the broken chair (discussion about different options of waste management). Lastly, one final character was added to the story – a character who is an expert in repair and dealing with the broken product. This character will try to give some facts about material and quality of the broken product. The character in this story is a carpenter. The aim with having an expert character in the book is to give the children knowledge about material and quality of, in this story, a wooden chair and to present a profession for inspiration to the children. The combination of characters and their contributions and personalities is somehow all related to the three approaches of learning that Johan Öhman argues about which I also have described in section 2.4.

4.4.2 Storyboard
In the process of creating the story I used the method storyboard which can be read more about in section 3.7. During the design process the content of the story were defined and the final version of the story was decided.

4.4.3 Graphical illustration
As I explained in earlier chapter, I am not a professional illustrator in the children’s book field. However to keep the originality of my design and avoid using pictures from Internet, I decided to find some real characters and take some pictures from them in different position and movement. In the next step I tried to illustrate all characters based on my storyboard in adobe illustrator. In the final step I used all illustrated pictures and tried to do some adjustment in photoshop and at the end form all pages in indesign program with texts. During this process I learned more about perspective, shape, position
in the picture, objective and subjective in the pictures, form and colors. While I did this part of the project I got some critique against my graphical work from tutors which made me step out of the project where I reconsidered to change the whole project. This happened two days before my planned workshop. I was from the beginning aware of that the complexity of my project needs a group of experts in graphics, illustrations etc. to make a final book. My idea was all about making an example of a pedagogical toolkit – a prototype and not a professional book. I decided to move forward with preparing my workshop, but I was not confident about the continuance of my project.

Table 49, 50, 51 & 52: illustration of characters in the book
Table 53, 54, 55 & 56: process to put all illustrated pictures into the pages and combine them with text.
Table 57: cover of the book

Table 58: Julia go to school

Table 59: In the kindergarten class

Table 60: environmental issue
4.5 Workshop

I prepared a workshop to try out the combination of storytelling and the interactive part in my toolkit, with the children and the teacher at kindergarten. The purpose with this was to evaluate the concept of my toolkit. I wanted to see and understand the reaction from the children in order to get feedback for further development of my prototype. Due to time limitation I did not had the opportunity before final deadline to try out a complete prototype. Therefore, I prepared a short version of the story, focusing on the key-concept and the interactive page and product. However, I do think that this project needs another workshop, when the prototype is finished, which I am planning to do in the next module. In the workshop that I performed I met eight children and one kindergarten teacher. I had prepared the story for the teacher to tell and a prototype of the storybook with some pictures connected to the parts of the story that were used in the workshop. I also brought the interactive product – the chair. The teacher read the story while the children were looking at the pictures (fact-based and normative). In the last picture, a question was asked to the children- how they could help Julia with the broken chair. A pluralistic discussion took place where the the children answered:

- “she can repair it”
- “she can glue it”
- “she should repair it with glue”
- “she should hold it upside down to repair it”
- “she needs equipment”
- “I don’t know”

Table 69, 70 & 71: prototype of story for workshop

Table 72: workshop in kindergarten with children
After the discussion about how the children could help Julia, I gave them the real size broken chair. The children started directly to look at it and try to fix it. It surprised me that the children without any help or instructions fixed the chair very quickly. Afterwards all the children were very happy that they fixed the chair and helped Julia. In the end of the workshop I gave the children some color markers and tape to help Julia and paint the chair. All the children started to paint on the chair, but not in the way that I expected. One of the children tried to cover the broken part with color tape. Another child then covered the other leg with tape to make them similar. After the children finished the painting, I asked if some of them wanted to sit on the chair and talk to me. Four of the children said yes and I asked the following questions:

- How old are you?
- Did you like the story?
- Have you heard such a story before?
- Why did you help Julia to repair her chair?

All the children liked the story and all of them answered that they had never heard such a story before. The reason for why some of the children helped Julia to repair the chair was because they like to repair things and one child said, “it is more environmental friendly (miljövänligt) to repair than to throw it away”. When I was going to leave some
of the children asked me about Julia. They wanted to know if I was going to give back the repaired chair to Julia and if I was going to meet her when I left. This made me realize that the character in the toolkit and the story had become real for the children. This was something unexpected but also something amazing. It was evidence of that the children did connect to the story and the interactive product. The result of the workshop made me confident about the project again. Some reflections that I made during my workshop was how quick it all finished. It might have been because of the limitation of the prototype and the small group of children that participated. I also realized how hard it is to do all documentation of the workshop by myself.

Table 76: painted chair, result of the workshop.
5 Analysis and conclusion

The purpose with this project was to plant a seed, to change the mindset of today’s children, who are the future influencers. The purpose was also to try to answer my research question of how the value of repair can be increased through resilience. Looking at the result and what I have been trying to contribute with through this project there are some parts and results which can be analyzed further. To begin with, the pedagogical toolkit, was designed at a prototype level. Even though I can see a finished prototype in the end, it still needs further work and additional collaborators in order to be completed and used in a wider perspective. I was aware from the beginning that I am not a writer or an expert in graphical design. However, the point has never been to design a complete and successful children’s book as a part of my toolkit. The purpose has been to stipulate an example of how I think the value of repair can be increased through resilience. To prepare an example of a toolkit was also the first step of the journey in planting a seed and open up a discussion about repair in the Swedish society through education. Due to the lack of illustrative and writing expertise, it might have not been possible to actually learn the children detailed information about waste hierarchy and prevention of waste, as to the level of fact that I have been describing in this thesis. However, in my opinion, the try out of the core concept of my toolkit and the combination of storytelling and interaction has contributed to an increased discussion about repair at the local places where I have been trying out my concept. The workshop at the kindergarten that I have been collaborating with, did result in positive feedback from the children about the story and the interactive parts of the toolkit. A pluralistic discussion occurred when the children were suppose to answer on how they could help Julia with the broken chair. The majority of the children did manage to connect to the content of the story (the fact-based part) and the interactive part very well, which resulted in a choice where they helped the character to repair the chair and reflected upon why they did it (normative part where they were nudged in the direction that I wanted). I am not sure that the children did understand the different approaches from Öhman being hidden in the story. However, using the three different approaches consciously in the structure of the story, has according to my opinion been contributing to my result. As I understood Öhman, the three approaches were to be seen as alternative to each other discussing different learning approaches in relation to sustainable development. However, since I am a designer and agent of change, I tried to combine all of them in the story and they are all somehow necessary in my story. It is not
possible to evaluate if the combination has contributed to more knowledge than if I had been using only one of the approaches. However, in order to nudge the reader in a certain way in my story – to choose and/or be aware of repair as an option, I had to combine a fact-based and a normative approach in the story as a foundation for the pluralistic discussion which occurs when the reader interact in how they can help the character. To climb up the waste hierarchy and make the prevention of waste of greater importance, the structure of the story had to involve normative aspects of choosing repair instead of throwing things away or recycling it. I am aware of that repair is not always possible, depending on the quality, cost or the material, which my character Julia also points at in the story. However, the importance of reflecting upon what options of waste management there is, where waste is not only produced but also prevented, must be pointed at in society, if our planet shall survive from consumerism. This is what my project has been aiming to do. I have been working with a complex combination of a concept related to sustainability. My contribution has been striving to create a new consumer practice by designing a pedagogical toolkit where the children was supposed to be nudged into choosing repair instead of throwing things away- in other words a change of mindset and behavior through resilience. According to my opinion, I have at the local places where I have intervened as a designer, contributed with opening up a discussion about repair. I might have not increased the value of repair at this stage of the project, but I do hope that my toolkit has started a discussion and a thinking process in those children’s mindset. Hopefully, it might contribute to a better link to the knowledge that will be taught in educational Sloyd in a few years, entering primary school and hopefully it will be a start of something new within the pedagogical aspects as regards sustainability and waste management.

In conclusion, the value of repair can be increased through a pedagogical toolkit consisting of storytelling and an interactive part where the children and the teacher interact and learn. The prototype of this particular toolkit has in my opinion started as a planted seed of change- a discussion about repair has started. How this project can be developed will be left to the unknown and future exploration of the matter.
6 References and literature

Literature
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Articles

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https://www.youtube.com/watch?v=zCfazf2gVuo

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Interviews
Kindergarten teacher Therese Källner
Supervisor Hannah Hofverberg
Anonymous employees BR and Toys R us Växjö
Appendix

Reflection writing about exhibition

The core of my project and the exhibition was of course to present the toolkit. However, the purpose of the project and the result and reactions from my workshop and final presentation was also something that I wanted to try to mediate and show at the exhibition. At first, I thought that it would be a good idea and very artistic to just show the book and the chair and let the audience use the imagination to understand my project and the purpose behind it. At a second thought on this, I realized that the design concept would in such a structure be hidden. I wanted to present my project in best possible way. I had to find a way to show the toolkit, but also to present the purpose and thoughts behind my project, which could open up a dialogue at the exhibition. I started to do some brainstorming to find important elements. The brainstorming resulted in a list of four important elements which created the core of my exhibition structure.

1. The toolkit – the storybook and the chair
2. The value of the chair
3. The function of the chair (visually and physically)
4. The workshop process at the kindergarten

In parallel with my brainstorming there were a lot of discussions in the class about “the satellite”. It was unclear for me what this satellite was all about. I was also asked and suggested to do another workshop during the exhibition as a part of my presentation and to satellite it. At first this sounded as a really good idea. The previous workshop gave me very good results and reactions and I was tempted to do another workshop. However, I realized that doing another workshop with the same chair would not be possible, since I only got one chair which was already colored after my first workshop. I could not use the same concept for my workshop another time at the exhibition. The result of my first workshop and how it turned out was very important to me and I didn’t want to change the chair only to do another workshop. My project is about a pedagogical toolkit to be used at kindergarten. Therefore, the exhibition was not the right place for another workshop where my project could be further evaluated and reflected upon. This mainly for the reason, that the audience at the exhibition would for sure not only be children. Creating another workshop at an exhibition might have been a good idea later on in my project, but not in the initiating stage where the seed of change was planted and where my primary target group was children at kindergarten level. I decided to move on with my four important elements and how they could be visualized.

Creating another workshop in order to present the functionality of my chair, was neither an option. The chair had already been used once, and making a new chair only for the exhibition was directly against my concept and connection to waste hierarchy. Another way to present the functionality of the chair was to let the visitors interact with the chair. However, this type of presentation also had some problems. I didn’t know how the visitors would behave and interact with the chair. Would the visitors place the chair in the exact same starting position, every time? Definitely not. Leaving a tangible product in a visitor’s hand always open up for change and some kind of error. One visitor might leave the chair upside down. Another one with the leg taken off the chair etc. There is no guarantee that the presentation of the chair remains the same for all the visitors, if interaction on free basis is a part. In some projects this might even be an advantage, but...
in my project, the functionality of the chair is a part of the design and the toolkit, which is something that I want to show all the visitors. In the end I decided to show the functionality of the chair with a 3D modeling animation through a tablet. This helped me to keep the originality of my chair for presentation at the exhibition but at the same time present the functionality of the chair to the visitors. Using Animation also enabled me to add some text where I shortly could describe why my project is important and what I wanted to contribute with.

Another important element was the value of the chair. It was very important that the visitors could see the uniqueness of my chair. Not just because it was a breakable chair that I designed to be broken and repaired several times, but also because it was a result of my workshop with some original painting on it made by children. The first idea was to present the chair and the book placed on the chair. This idea changed after the installation group decided to use some cubes made of play woods and some modular wall of play wood. In order to increase the value of chair I decided to present it as a luxury item to make people ask why such a chair has a special place for presentation. For this I came to idea to present the chair on a pillow with a luxury material. The color of the pillow was very important to make my chair unique and special. On the other hand, a pillow could keep away visitors from touching my project. I had to decide between letting visitors to touch or not.

I also wanted to show the process and some pictures from the workshop, since that was a very important part of my result in the project. I decided to make a poster. I didn’t want to take away the attention of the toolkit (the book and the chair), but at the same time I wanted to show important elements of the design process – such as the workshop. To achieve this, I decided to make one simple poster – representing less is more. The important was the toolkit.

When I was installing my project at the exhibition, I realized that the placement of the book was wrong. The chair with the book on it, didn’t catch the eye and the concept of uniqueness wasn’t obvious. To make it more obvious I decided to make one extra shelf. I already had one shelf to place the tablet on, presenting the functionality, but I added another one for the book. This made both the chair and the book more visible.

During the opening ceremony I analyzed some of the visitors and I saw that a lot of the visitors took the book and looked further into it. However, no one or at least not many visitors touched the chair. No one tried the functionality of the chair after they had watched the 3D animation. It might have been my visualization on the pillow giving that extra value to the chair which contributed to that result. I also decided to show the functionality of the chair in reality to some of the visitors. The result of this was that the visitors actually dared to touch the chair and asked more questions about the chair which was very interesting.
Table 76 Final Exhibition at Konsthall museum in Växjö city