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Educational Hygiene for Children

A study of children and hygiene, and the development of educational hygiene products

Master of Science Thesis in the Master Degree Programme, Industrial Design Engineering

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CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden, 2009

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This master's thesis was carried out in cooperation
with SCA Hygiene Products AB.

Cover:
[The resulting final concepts: a soap dispenser with a timer and a toilet paper with pictures. See chapter 12 for further information.]

[Chalmers Reproservice]
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Preface

This master's thesis is the final examination for a Master of Science in Industrial Design Engineering from Chalmers University of Technology in Göteborg, Sweden. It was carried out at the company SCA Hygiene Products AB (department Tissue) in Göteborg, Sweden. We would like to thank everyone that has helped us during this thesis and contributed with their knowledge and support. Our time at SCA Tissue has been very exciting and rewarding, and we would like to thank everyone at Tissue for being so helpful and friendly. We would like to send a special thanks to our supervisor Eva-Li Saarväli for her support and help with SCA related questions and for promoting our thesis at SCA. Many thanks should also go to our supervisor at Chalmers, Li Wikström, for supporting us in the creative process. Our examiner Anna-Lisa Osvalder has been of great assistance with report and thesis issues for which we give our thanks. We are also very thankful for the help received from Göran Brännare at Chalmers regarding the mechanical solutions. Jonas Ingmarsson should also be thanked for helping us with questions regarding soap and soap dispensers. Lastly, we would like to thank the day-care personnel and all the parents that participated in our studies.

Sofia Granhed & Frida Lundgren

Abstract

This master's thesis has been carried out at SCA Hygiene Products AB (Tissue) in Göteborg, Sweden. Children and hygiene has been studied closely in literature and user studies, especially the learning aspects of it, in order to develop a product or a product range that will facilitate children's learning of hygiene habits. Sustainable development has also been considered during the project. The project started very broad with a pre-study on the subject of children and hygiene at the ages 2-8 years researching literature on child development, behaviour principles, as well as preforming benchmarking and questionnaire on the subject. The target users were redefined as children 4-6 years old as this is the age most learn hygiene routines. User studies in the form of questionnaires, observations, interview and focus group were performed to get deeper knowledge of children's hygiene development. This phase of information gathering was then analysed and interpreted which resulted in three areas that most children have difficulty learning; taking appropriate amount of toilet paper, properly washing hands and wiping after bowel movement. After the needs identification the concept development was started. The iterative process of idea generations and evaluations resulted in two types of products –a toilet paper with print to help children understand the appropriate amount of paper and a soap showing the time needed for a proper hand wash. An important aspect of this master thesis was that the target group was changed from children to family due to the results from user studies. The products would still have to have a pedagogical purpose and appeal to children but they would also have to appeal to the rest of the family. A new brand was created to help decide the visual expression of the products and what values they should convey. The thesis finally resulted in the two concepts: a toilet paper with a picture on each square to facilitate the learning of taking appropriate amount of toilet paper by e.g. counting the squares and a soap dispenser with an attachable timer that shows the appropriate time for a hand wash in order to get children to wash their hands more careful and for a longer time. The two concepts have a common design that express the core values for the created brand and fulfils the demands found from theory and user studies. Some demands are difficult to know if they are fulfilled therefore it is recommended that the concepts be tested with users.

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Part I

Part II

1. Introduction

Children and hygiene is a large area to study, hence this chapter defines the aim, limitations and scope of the master's thesis. The background of the project as well as an introduction of the company is also given.

1.1 Background

Personal hygiene is an important area of anyone's life and something that children start to learn at a young age. Despite this it still takes time for them to learn the skills and routines. SCA, a successful hygiene goods company wanted to explore the area of children and hygiene more closely and therefore commissioned this master's thesis. The area of interest was children and hygiene especially the learning aspects of it. Hence the main age group to study was children that have stopped using diapers and are learning to take care of their own hygiene.

1.1.1 SCA - The company

SCA (Svenska Cellulosa Aktiebolag) is a global consumer goods and paper company. SCA is comprised of four business areas with the major ones being Personal Care, Tissue and Packaging. (www.sca.com) Tissue is the department this master's thesis was carried out for, and comprises of two areas: Consumer market and Away-From-Home where both concentrate on products and systems primarily for tissue products (e.g. toilet paper).

The mission of SCA is "to provide essential products that improve the quality of everyday life" with the vision of being "recognised as the leading provider of value for customers, shareholders and employees in its field." SCA therefore always strives for high quality in both the products they sell as well as a company on the global market. This is why there is the ambition to be at the forefront of sustainable development and work with the highest possible economic and environmental standards. The core values; respect, responsibility and excellence, also reflect this in addition help define how the SCA Group are to do business financially, socially and environmentally. (www.sca.com)

1.2 Aim

The aim of the master's thesis is to study children and hygiene through user studies and literature to later develop a product or a product range that facilitates the learning and practice of personal hygiene for children. The product or product range should fulfil the demands found from theory and user studies, and should be as sustainable as possible. This is ensured by considering sustainability issues and working with sustainable product development. The product or product range must match SCA's values, brand and visual brand identity. The goal is to produce a concept or concepts in the form of CAD renderings and sketches.

1.3 Scope and limitations

The general scope and delimitations of the thesis were defined with help of the supervisor at SCA and at Chalmers. The scope and delimitations below are broad due to the exploratory nature of the thesis. The scope continually narrows and further delimitations are set throughout the thesis as information and knowledge is gained.

Scope

- The study focuses on personal hygiene meaning bodily hygiene (body and hands). Involuntary behaviour such as bed wetting is not included as personal hygiene.
- The thesis only examines the consumer market meaning the developed product or products are for consumers (i.e. parents) and not for public use (i.e. day-care centres or schools).
- The thesis is carried out at SCA during circa 5-6 months in Gothenburg, Sweden.

Delimitations and constraints

- Oral and hair hygiene is not studied.
- Children outside of Sweden under the age of two and over the age of eight are not studied in this master's thesis project. Children with disabilities are not studied.
- There are no restrictions to which types of products can be developed, however preferably the product or one of the products in the range should be tissue related.
- The resulting concept or concepts of the thesis are not final and ready for the next stage of examining production and materials. Hence, material, construction and production issues of the concepts are not examined in detail; however, those issues are dealt with during the concept generation to ensure the results are feasible and within a reasonable cost. The concepts should be able to be manufactured with technology available today.

2. Execution

This chapter describes the work process of the thesis which was divided into two parts: needs and problem identification, and product development. A description of how sustainable product development was worked with is also included.

2.1 Work process

The master's thesis is divided into two parts and each part took about half the time of the thesis. The overall work process is described below, however the details of the execution are explained in each chapter. See figure 1 for an overview.

2.1.1 Part I - Needs and problem identification

The first phase of a development process is an analysis phase. The aim is to identify the user needs and problems. The basic process can be divided into four parts. Firstly a pre-study is done which is then followed by user studies. The carrying out user studies is iterative meaning after each user study the information is analysed to determine if more information is needed and then the process is repeated. The last step is to interpret and analyse all of the information and data from user studies to clearly define the needs and problems.

Pre-study

The purpose of a pre-study is to study the existing knowledge of the topic before carrying out your own studies. Due to the thesis aim having to do with developing products that help children learn to take care of their personal hygiene, it was first required to gain the necessary background knowledge of general child development in order to be able to examine the topic of children's hygiene development. Hence the literature study began with general child development of children of the ages 2-8 years and thereafter a literature study of development in the context of hygiene. Benchmarking of the current market for child products for personal hygiene was also performed to gain further insight into this subject as well as examine how this area has been addressed by others. It became evident that there is little literature on children and their hygiene development hence a questionnaire was conducted to gain more information on the topic. After having analysed the pre-study result the thesis scope was further constrained to bathroom visits and hand washing.

User studies

After the extensive pre-study, the next step was to find the needs and areas of improvement. Information was gathered through different methods such as observations and focus groups which are described in more detail in chapter 4 and chapter 6. After each study, results were interpreted and the results evaluated to see what more studies would be needed.

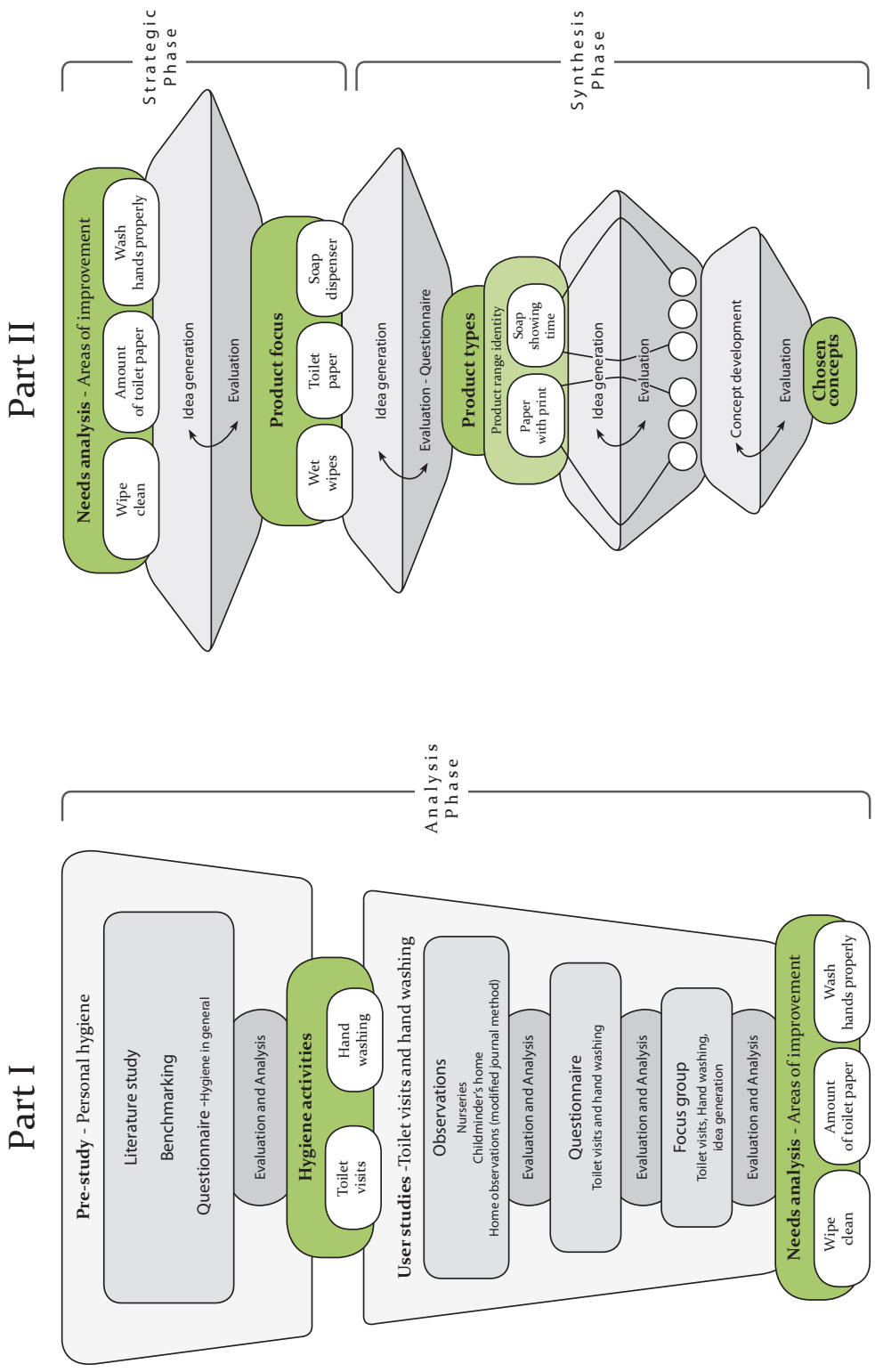

Figure 1. Diagram of the work process

Needs analysis

After this phase of information gathering and user studies the results must be interpreted and analysed, this is called Needs Analysis. The question method was used to help analyse the data and define the problem areas and important user needs in the use situation. This is done so that an appropriate and useful product is developed. Three problem areas, or areas of improvement were found.

2.1.2 Part II - Product development

The second part after having identified needs is to start the development of concepts, the so called synthesis phase. It was started with an initial idea generation on how to solve the improvement areas. This idea generation was done without any restrictions in order to not inhibit the creative process. After an ample time of idea generation, the ideas were evaluated on potential and how realistic they were in order to help decide which kinds of products to focus on. Three product areas were chosen to focus on, which concluded the strategic phase.

Once the product areas were chosen, another idea generation iteration could be started, this time on more detailed product ideas. The ideas with most potential were evaluated with the help of questionnaires. The questionnaires were also used to study users' habits, preferences and opinions of the three product areas so that there was a good basis for a requirement specification.

After the product ideas had been chosen, it was possible to more closely examine aspects required for creating concepts such as the users and the brand identity of the concepts. A requirement specification could then be drawn up using all the demands found from studies.

The last step was to develop the product ideas into concepts. This process like any idea generation process was an iterative process with many cycles of idea generation and evaluation, constantly narrowing down until final concepts had been reached.

2.2 Sustainable product development

The Bruntland Commission of the UN defined sustainable development in 1987 as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (www.un.org). In order to achieve this sustainability of the three major parts of a functioning society; the environment, economics and sociopolitics must be dealt with. Hence "sustainable development" is divided into ecological/ environmental sustainability, economic sustainability and sociopolitical sustainability. (Nilsson, 2004)

Nowadays, sustainable development is well-known and many people are aware of the issue. Companies are also aware of the issue and some, such as SCA, work actively with sustainability (www.sca.com). There exists many ways in which a company can work towards a sustainable development. The area that there is most focus on is the ecological and environmental aspect i.e. the minimising of the ecological impact their services have on the environment.

When it comes to product development, sustainability is most of the time concentrated on the ecological issues. However, it is important to also consider the social aspects when developing products. For example, ensuring that all the human rights of the labour employed in manufacturing are respected or that any indirect impact of the company's production and operations are handled responsibly (Nilsson, 2004). Social sustainable development is often on a very large scale and due to the frame of this project social sustainability questions will not arise.

Economical sustainability is considered in this project by ensuring that the developed product is a good product that fulfils a consumer need thereby securing a market long-term and strengthening the company's brand. A product developed with a good base in consumer needs and with ample time will also less likely result in unpredictable costs due to poor design. Apart from this, economical sustainability is not further touched on.

Therefore in this project, ecological sustainability issues were mainly considered. There are many proposed processes for working with ecological sustainable product development as this is still a relatively new field. However, an agreed approach to eco-design is life-cycle thinking. Life-cycle means the entire life of a product i.e. from design, to production, transport of product to retail, use of product, and disposal. In previous decades much focus was on environmental impact during production and end-of life (product disposal) but to really minimise a product's impact on the environment the entire life-cycle must be optimised with respect to ecological issues. Because the majority of a product's lifecycle-phases are already determined early in product development it is vital to work with sustainability already at the initiation of project. (Norrblom, 2000)

2.2.1 Analysis phase

During this phase of product development the needs of the users' are examined. To minimise environmental impact of one's product, this phase needs ample time to be examined so that the product is something that customers' have real need for, and fulfils their demands. This is both from an environmental and economical/financial perspective.

In this phase it is also interesting to ask users of their environmental product demands (i.e. how important it is to them that the product is environmentally friendly) (Norrblom, 2000). This is so that when it comes to

choosing product type it is a product that both fulfils the user needs and is able to sell. For example if users are not willing to pay a certain amount of extra for an exceptionally environmentally friendly product then there is no point in pursuing that.

If a product is already in mind at the start of a project different approaches can be taken. However, in this project these approaches are not appropriate and therefore not examined.

2.2.2 Strategic phase

In the strategic phase it is decided what product is to be developed which fulfils the user needs. When choosing product it is good to think from the perspective of what needs are to be fulfilled rather than what product best fulfils those needs. This could lead to ideas and solutions that in effect have much less environmental impact than the traditional product because the design team thinks more openly, e.g. a product could be replaced with an internet service. It also often leads to products that have optimised functionality which often leads to minimised environmental impact. In this project this type of creative thinking was done in the first initial idea generation but the conclusion was that products best solve the problems. (Norrblom, 2000)

2.2.3 Synthesis phase

The synthesis phase is about generating ideas and solutions and eventually reaching a final product. Initial idea generation should never be interfered with or kept within boundaries as this can obstruct creativity. However, one can use a tool called Eco-design Strategy Wheel to help brainstorm ideas and then evaluate each concept followed by another brainstorming on how it can be improved. (See chapter 8.1.7 for a description of the method and chapter 11.2.2 on how the Eco-design Strategy Wheel was used in this project.) It is most important to consider sustainability when evaluating solutions because if a concept is chosen without having considered the ecological sustainability of it, the resulting product can never be optimally designed for minimal environmental impact (Norrblom, 2000).

For ecological sustainable development, there are an array of methods to help in product development e.g. Life Cycle Analysis (Norrblom, 2000). However, many of these are very focused on the details of production, distribution and so forth, and therefore is beyond the scope of this thesis.

Part I
Needs and problem identification

Part I of this report describes the need finding process which includes pre-study and user studies. Part I gives the necessary information and requirements for the product development of Part II.

3. Theoretical framework - Part I

This chapter includes a description of child development of children aged two to six years. Theory on behaviour principles is also presented. This is to provide the theoretical framework for the thesis and the user studies.

3.1 Child development

Children's physical, social and emotional, and perceptual and cognitive development is great during the years two to six. Only an overview of the development in these areas is given below. (See figure 2.)

Physical development

Children's physical ability will change a lot through the years. The balance is quite poor the first years but will improve up to three years of age. Knee- and wrist- joints will be easier to bend and the child often prefers running over walking. The fine motor skills are limited for children up to three years of age but then they are able to use one hand without the other one following.

Four- and five-year-olds are able to manage their movements well but sometimes exaggerate. They are more skilled with their hands which make them want to use their hands more. The five-year-old has better control of the movements and the balance is better. The five-year-old is also able to use tools like a hammer, needle, toothbrush and a pen, and they can use the soap correctly when washing themselves.

At the age of six the child's body will change a lot; arms and legs will grow and they have problems with coordinating the movements. In addition, some of the motor skills will decrease again and it might be difficult for the child to perform activities that were not a problem before. The fine motor skills will develop faster for girls than for boys which explain that girls often choose activities that require more precision while boys choose more powerful activities.

(Alin-Åkerman, 1995)

Social and emotional development

The age of two is often a very calm period which is by Ulin (1949) called "the willingly obedience period". However, the two year old can be a bit circumstantial when it comes to everyday tasks like dressing and going to the toilet (Alin-Åkerman, 1995). At two and a half years of age, the calm period is over and the child has, according to Gesell (1961), a defiant period when he/she has to explore the different options to things like yes or no, run and stop and so on. The child likes rituals during this period and is sensitive to changes in the environment. This period is rather short but at the age of five and a half they will have a new defiant age. (Alin-Åkerman, 1995)

The phase between one (or one and a half) to three years is called the anal phase. This is a stage when the child discovers the area around rectum. When this phase begins it is time for toilet training. However, not until the age of two to three years will the child be able to estimate the time needed in order to get to the toilet in time. A three year old has usually begun to learn how to perform the everyday tasks like eating without help, going to the bathroom, and partly dressing themselves. At this age they are generally more aware of themselves and other people and they investigate how it is to be more independent, but they quickly return to the adults when something goes wrong. This is therefore an appropriate age for children to learn how to take care of themselves and be more independent. When they are four years old they can usually dress themselves but they have not learned things like what is back and what is front, putting the right shoe on the right foot, tying the shoelaces and so forth. They usually know how to wash their face and hands, and they can eat and talk at the same time. (Alin-Åkerman, 1995)

Children between the age of three and five are usually very egocentric; they can only see things from their own perspective and they cannot understand that a situation can be experienced in another way. They are usually more self-critical and therefore often brag and exaggerate in order to assert themselves and they also brag about their parents' skills. Children often want to show what they have learned and what they can in order to draw attention to themselves. Four-year-olds therefore need certain rules but they also need their freedom. Between four and five years, the child is still trying to adapt to the environment and its demands. They are both socially dependent and independent. The age of six years is a period with strong development. It is a troublesome age which is characterised by lability and worry. The child is standing between dependence and independence and feels that it has to be assertive. The six year old is very self critical. This is a new defiant period. First, at seven years of age will the child have a calmer period again. (Alin-Åkerman, 1995)

Perceptual development

A child below two years of age uses the mouth as an orientation organ but at the two to threes of age this will decrease. For example, children between the two to three years old have difficulty seeing a picture as a whole if it is not structured. The child might then see the parts as separate and not as one picture. But during this period the visual ability quickly increases and at the end of age three the child often has the ability to use only sight to understand an object. The haptic sense is still very important though, as they usually do not settle with only looking at things; they also want to touch them. The visual orientation will still increase till five to six years of age. (Alin-Åkerman, 1995)

In the early years colour is more of interest than form, and around the age four to six years the child is more aware of form than colour (Kopacz, 2003). However, there is literature that contradicts this which is

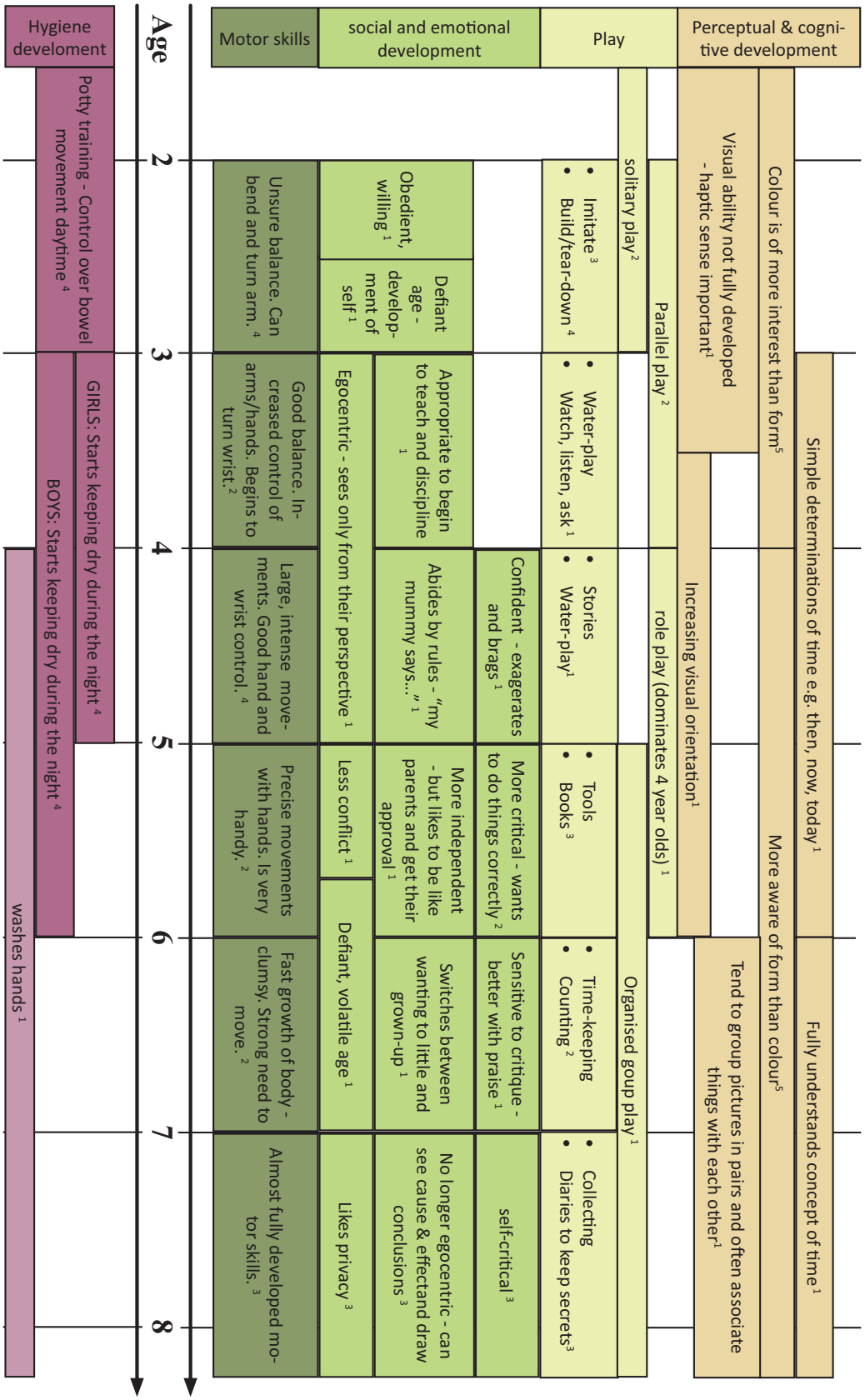

Figure 2. Timeline of developmental milestones from the age two to eight years old

important to bear in mind. However, there has been some consistency in studies of children's colour preference testing. Brilliant colours (strongly saturated colours) are preferred by young children and as the child grows older less intense colours are preferred. (Kopacz, 2003) A study shows that six-year-olds will discover symmetrical pictures long before asymmetrical pictures and they tend to group pictures in pair and often associate things with each other (Alin-Åkerman, 1995).

Cognitive development

The ability to keep attention focused on one activity or theme increases with age. At the age of three the attention span is limited, and an activity can easily be interrupted if something happens nearby that grabs their attention. A parent or adult must then direct their attention back to the previous activity.

The memory capacity also increases with age. A study, where the children were asked to open a box which required them to use a new unfamiliar grip, showed that three-year-olds remember this new grip for 9-15 days and four-year-olds up to 20 days.

Understanding of time is a sign of mental maturity. It can be difficult for children to understand the concept of time but a three- to four-year-old can understand simple determinations of the time like before, then, now and today. Four-year-olds are able to express time based on their own experiences. Not until the age of six will the child completely understand the concept of time.

(Alin-Åkerman, 1995)

3.2 Behaviour principles

Behaviour principles are sometimes called learning theory because all behaviour is in some way learnt. There are many ways that behaviour can be learnt and is affected by many factors.

All behaviour has a consequence or an outcome and whether this consequence is experienced positively or negatively will affect the next behaviour. These are called reinforcers or punishers. If the behaviour results in a positive experience the behaviour is reinforced, and vice versa. This is fundamental in behaviour principles. These are principles parents use when raising their children.

Parents are important when it comes to shaping their child's behaviour. There are four main ways new behaviour is learned: Shaping, observational learning (modeling), prompts and rules. Shaping take the longest time, and is the gradual shaping of behaviour through first hand experience. Observational learning or modeling is when new behaviour is learnt by imitating someone else's behaviour. Prompts is the use of different

types of signs and signals to start a behaviour. Rules are guidelines or instructions that tell you how to act. These approaches can also be used not only to learn new behaviour but also to modify behaviour, i.e. behaviour modification.

Shaping is the slowest way to learn new behaviour as it is more gradual than the other approaches. Observational learning is also quite a fast way to learn new behaviour, but depends much on the complexity of the new behaviour, the initial skill level and so forth. A great deal of behaviour seen in everyday life is learnt through observational learning, and is often used in behaviour modification. Prompts are a common part of behaviour modification, especially when dealing with children. After giving a prompt the behaviour should be reinforced to increase the speed of learning and to increase the likelihood the behaviour is continued with, e.g. the parents praise their child after having behaved in the desired way.

Rules are the fastest way to learn new behaviour. "In many situations were shaping, observational learning or prompting may take a long time to produce the desired behavior, a rule can take effect immediately" (Baldwin & Baldwin, 2001, p. 267). This is because rules describe what behaviour to apply. Rules often specify when and/or in what situation that behaviour should be applied and what the consequences of the behaviour is. The context in which the rule is given affects whether the person will follow the rule, for instance the authoritativeness of the rule source affects the likelihood the person will use the rule, e.g. a parent telling a child. "Parents usually find that giving a child a rule...speeds the child's learning considerably" (Baldwin & Baldwin, 2001, p. 267). Rules help children to do self-instructed, rule-governed behaviour the next time the situation occurs. In addition, due to the fact the parents are an authoritative and trustworthy source for the rule the children are more likely to follow the rule.

Rules can be explicit or implicit; clear and exact rules or not directly formulated. "Children need quite clear and explicit rules if they are to succeed in following them" (Baldwin & Baldwin, 2001, p. 266). For example, "set the table Billy" does not contain enough useful information. More explicit rules work better e.g. "Put napkins on the left side of each plate; then come back and I'll tell you what do next" (Baldwin & Baldwin, 2001, p. 267). Rules can also either be enforced by the rule giver which is called a command or it is not enforced and called good advice. Because children do not have much experience with rule use, they most of the time need commands together with reinforcers or punishers in order to properly follow rules. But as they develop and gain experience with rule use, commands are not as important and the value of good advice is learnt.

(Baldwin & Baldwin, 2001)

4. Methods - Part I

This chapter describes the methods used during the needs and problems identification phase; user studies and needs analysis.

4.1 User studies

The methods to carry out user studies (observations, interview, questionnaire and focus group) are described below.

4.1.1 Observations

The aim with observations is to get knowledge of the user situation in their natural environment without affecting the ongoing process. By using observations, behaviour which the users are not aware of might be detected which can be difficult to detect by using, for instance, interviews (Osvalder et al. 2008). This is because only explicit needs are detected in methods where the users are asked questions, whereas in observations actions and behaviour that the user is not aware of can be revealed i.e. implicit needs. Hence it is important to use different kind of data collection metods to ensure that all needs are detected. In addition, when it comes to children there are often individual differences between children of the same age which will be noticed easier when using observations (Brenner et al., 1979).

There are two types of observations: direct observations and indirect observations. Direct observations mean that the observer is present and observes what he/she is interested in the situation. It is very important to be discrete when performing direct observations to avoid influencing the person that is observed. (Osvalder et al. 2008) The observer should not ask any questions or make any experiments (Brenner et al., 1979). Indirect observations mean that no observer is present during the observation; video- or computer camera is discretely used instead (Osvalder et al. 2008). Only direct observations are used in this project.

When performing direct observations it is important to remember that the observer is there to collect information, not to respond or act so as to influence the results. The best way to achieve this when it comes to child observations is to be as unobtrusive as possible and not attract attention. Eye contact during the observation should be avoided in order to stay out from the children's play since they often tend to invite people around them to their play. The observer should wait for about 10 minutes before the actual observation starts in order to absorb the atmosphere. (Fawcett, 1996)

Where the observation takes place influences the child in different ways; children might change behaviour depending on where they are and the situation. A location could be the day-care centre, the preschool, the play-

ground, or in the home. Observation in a private home setting is very different from observations in an environment with a group of children and several adults. More empathy and respect is needed when observing in a home setting since this is not a public, community facility, but a private and very personal environment. (Brenner et al., 1979)

Event sampling

An important decision to make before performing observations is whether the focus of the observation should be on all kinds of behaviour or only parts of it. For this project only parts of a child's behaviour is of interest, and a suitable observation method for this is called event sampling. The method selects data by concentrating on a particular short period of behaviour. This is a helpful tool when investigating, for instance, children's problem solving behaviour within a defined period such as tidying-up sessions, meal-times, etc. The actual observation time cannot be decided in advance but it should not be too long so as to be able to stay focused during the whole observation. (Fawcett, 1996)

It is essential to know in advance what actions or behaviours will be observed and clearly identify the aspect of behaviour or topic of interest (Fawcett, 1996). Questions to be answered during the observations could help the observer stay focused on the right actions and behaviours (Brenner et al, 1979). It is recommended to be prepared with a record sheet so that important information can be rapidly noted, but space for a narrative description is also needed (Fawcett, 1996).

Event sampling is probably the most common method used in preschool (Brenner et al, 1979). The method is suitable for any reasonably short, defined event and it is a good help in defining and understanding problems. It also might reveal cause and effect. However, the method requires an alert observer that is able to understand that an event is about to happen. (Fawcett, 1996)

Modified journal method

The oldest way to gather information about children is to keep a journal. Behaviour and events are noted in a journal over a period of time. There are two types of journals: one where all new actions are registered and one where only a specific behaviour is registered, for instance, language or hygiene routines as in this project. (Brenner et al, 1979)

A journal does not have to be based only on direct observations, interviews can also be made. The purpose with a journal is usually to identify the child's development within an area and in which order different behaviours appear. Keeping a journal will give a continuous picture of how a child is developing. The method usually means that one child is observed during a longer period of time to see how it develops. (Brenner et al, 1979)

This is however very time consuming and was found unnecessary in this project since only a few specific behaviours should be observed at different ages separately and not the development of one child. The observations were therefore performed during two days. This is why the method in this project is called modified journal method. Parents were asked to observe their child/children in their home and answer some questions about their child's hygiene routines and general questions about children hygiene and hygiene products for children.

Observation is a good method to use to aqcuire knowledge of a certain area and to gather information about different situations. Real behaviour in a natural environment can be studied without any disturbing questions and measurements. However, observation does not give any cognitive information about the thoughts and feelings of the user when performing a certain task or when using a certain product. Therefore, observations usually need to be complemented with for instance interviews and questionnaires to get a full picture of the user situation. (Osvalder et al. 2008) This however does not work in this thesis because children would not have the mental capacity nor the understanding to answer questions regarding their behaviour. Hence, observations have been complemented with questions to parents, and they have been a kind of interpreter for the child's behaviour.

4.1.2 Interview

Interviews are the most common method for collecting information about people's thoughts. The information collected are user's opinions which make the resulting information subjective. Interviews can be divided into three categories: unstructured, semi-structured and structured interviews. The choice of interview type depends on the aim of the interview. Unstructured inteview is when there is no structure or prepared questions. Structured inteview is when a question guide is used during the interview and there is no possiblility to ask follow-up questions. Semi-structured interviews are a combination of a structured and an unstructured interview. The interviewer has a structure of which areas to discuss but there is no exact order of the areas and there are room for follow-up questions. This is the most common type of interview since it has the benefits of both a structured and unstructured interview. (Osvalder et al. 2008)

4.1.3 Questionnaire

A questionnaire is a subjective method where the answers are given in writing. Hence, it is an indirect method since there is no contact between the person responsible for the questionnaire and the person answering the questionnaire. It is important that the questionnaire is formulated for the right target group.

The main purposes with questionnaires are the following:

- Gather data from a large group of people quickly.
- Gather data from people that are difficult or resource demanding to contact.
- Validate former results from interviews.

The questions must be simple, clear and unequivocal. Alternative answers or scales will give a relatively easy worked material. Pre-determined answers and scales can be used without the person answering the questionnaire having to use their own words. Since these types of questionnaires will give more standardised answers the results will be easier to compile. A questionnaire can also have open-ended questions which require answers formulated in words. These types of questions are preferable when the person responsible for the questionnaire is not sure of what to ask about. However, it might be difficult for the respondent to write freely when answering this type of question.

(Osvalder et al. 2008)

The result from questionnaires usually gives a quantitative analysis. Especially pre-determined answers results in a quantitative analysis while open-ended questions result in a qualitative analysis (Osvalder et al. 2008). Digital questionniare programs such as Easy Research and Google Forms can with advantage be used as the programs automatically compile the data. Digital questionnaires can also be answered and sent out using the internet making it easy to distribute.

4.1.4 Focus group

A focus group is a group discussion, or a group interview with 6-10 participants and a moderator as a discussion leader. A few predetermined subjects are discussed which are presented and led by the moderator. The subjects could be about experiences of a product, a work situation, a system or how a task should be solved. Pictures, photos and objects can be used as a help to start a discussion.

A focus group will give a versatile perspective on questions that shall be examined or solved. This method gives subjective and qualitative data since the respondents are quite few and the result will not contain any valid numbers. The structure should be loose to give room for spontaneity. Notes are often taken during the session and it is often recorded on tape for further analysis of the material.

(Osvalder et al. 2008)

4.2 Analysis method

The question method has been used as a help for analysing the data collected from user studies into a needs analysis (see chapter 6.3). It is a method used to better define the problem, the reason for the problem and who the user is.

Question method

The method is performed by answering the questions with several follow up questions. The questions force the respondent to think more deeply about the problem. The answers will lead to an analysis of the problems. Here are some of the questions used in the question method: What is the problem? Why does it exist? When is there a problem? Why at that moment? Who is affected by the problem? Why are they affected by the problem? How common is the problem? Why to that extent? (Osvalder et al. 2008)

5. Pre-study

The pre-study was carried out to gain necessary background information on the subject children and hygiene. This chapter describes the execution and results of the literature study, benchmarking and questionnaire.

5.1 Execution

The execution of the pre-study which included literature study, benchmarking and questionnaire is described below.

5.1.1 Literature study

Before starting with the project, some basic knowledge of the area was needed. To get better understanding of children and child development, literature on the subject was studied using books borrowed from the Gothenburg University library. However, hygiene development was difficult to find literature and information on so this knowledge would have to be gained from empirical methods. Literature on empirical methods was also read to prepare for the next stage of the project; the user studies.

5.1.2 Benchmarking

Benchmarking of the market for child hygiene products was examined to gain insight into what needs these products aim to fulfil and why, and where there is room for new products. Searching the internet was the main method of benchmarking. Since, many of the products found were American child toy stores were also visited in order to examine the market in Sweden. A visit was also made to the Baby and Child (Baby & Barn) fair at Swedish Exhibitions centre on the 27th of February. Here companies sell and promote products for babies and children as well as parents with children.

5.1.3 Questionnaire

The questionnaire would act as a complement to the literature study that was carried out. The questionnaire was done using a service provided for free called Google Forms. The questions asked related to children and personal hygiene. Due to lack of literature on the subject, the questionnaire covered areas such as the average age of different milestones in children's hygiene development, how long it takes for them to learn new routines, which areas children have trouble learning or performing, and which methods of teaching parents use. (The questionnare in swedish can be seen in Appendix A.) A link to the questionnaire was posted on parent forums, which was a fast and effective way to reach the target group.

5.2 Result

The result of the pre-study is recounted in the following section.

5.2.1 Literature study - child development

The result of the child development literature study is in the chapter 3. Literature study was also carried out for all the methods used in the project which can be read out in chapter 4 and chapter 8.

5.2.2 Benchmarking result

Products on the market today are developed for different purposes; they are designed to either help children to physically carry out certain tasks or to help teach hygiene practices. Some products are also developed only for the purpose to make the toilet visit more fun for the child; products with funny pictures and music to attract children of different ages. Examples of such products are soaps with a toy inside and stickers that can be attached to the toilet. There are also products that are a part of a whole concept for teaching children hygiene such as Toilet Buddies which is not just a product but also a show that goes on tour all over the world to teach children about hygiene. As well as Kandoo® which have bath products and a website with educating games to teach the child hygiene in a fun way. Some products are designed to help teach hygiene practices by indicating the right amount of paper to use with cute pictures (Cottonelle® For Kids) or showing how long the child should wash hands by playing a song (Soap Tunes).

However, many of these products mentioned above are most common on the American market. The European market is more focused on skin care products and mostly baby skin care. The appearance of these are usually discrete with light and soft colours. Examples of these are Natusan® and Barnängen®. Libero® has also recently introduced a range of skin care products for babies. There are not many products for children of the ages four up to teenage years, but more are being introduced to the European market. However, these products are very concentrated on hair and shower products such as shower gel and conditioners, such as Natusan® Kids. In general, there is a wider variety of types of products for children in USA than there is in Europe.

Products aimed to facilitate the child's use of the bathroom is common on both markets. A classic product is a stool; it makes it easier for children to get up onto the toilet seat as well as reach the wash basin. Another common product is a toilet seat ring adapted to the size of a child's buttocks to make it easier for them to sit on the toilet.

(See Appendix F for pictures and descriptions of some of the mentioned products.)

5.2.3 Questionnaire result

The questionnaire received 82 responses. The first part of the questionnaire shed light on the average age of certain developmental milestones. A timeline of the results is shown in figure 4. The darker the colour is the higher the percentage of responses. The results show that they correlate quite well with the little literature found (compare to figure 2 on page 12) but that sometimes the age is younger than first thought.

The second part asked more about what parents think are difficult for the children to learn and perform when it comes to hygiene activities. The top three activities parents noticed took the longest time for their children to learn was wiping themselves after bowel movement, washing hands a sufficient amount of time, and taking the appropriate amount of toilet paper (figure 3). The top three reasons parents think caused the difficulty in learning new habits/skills was that (in descending order) the child had no patience to learn (restless), child's physical condition (height, arm reach etc.) and the child not understanding the purpose of the activity.

When it came to what parents thought was most difficult for their child to physically perform the predominant answer was wiping after bowel movement, which they believed was because of the physical abilities of the child.

Parents mostly use imitation and repetition to teach their child how to perform hygiene, which they feel is very successful. Observational learning (imitation) is one of the most common ways knowledge has been passed down from parents to children. It is a method that works, but as the literature says it is also a slow way to learn new behaviour. (See chapter 3.2) Repetition is a form of prompts as the parents prompt their child repeatedly until the skill is learnt. This eventually results in behaviour change but it requires the parents presence which can be quite demanding. A fair amount (19%) did not do anything in particular to teach their child.

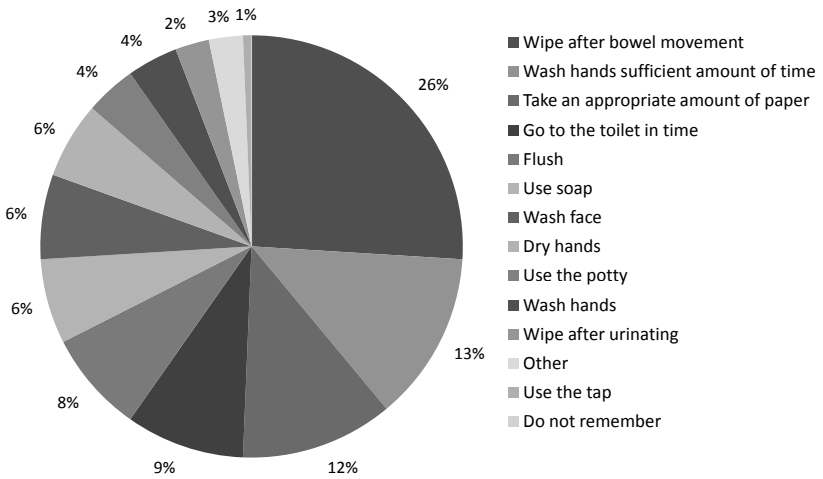

Figure 3. Questionnaire result: What took longest for your child to learn when it comes to hygiene practices?

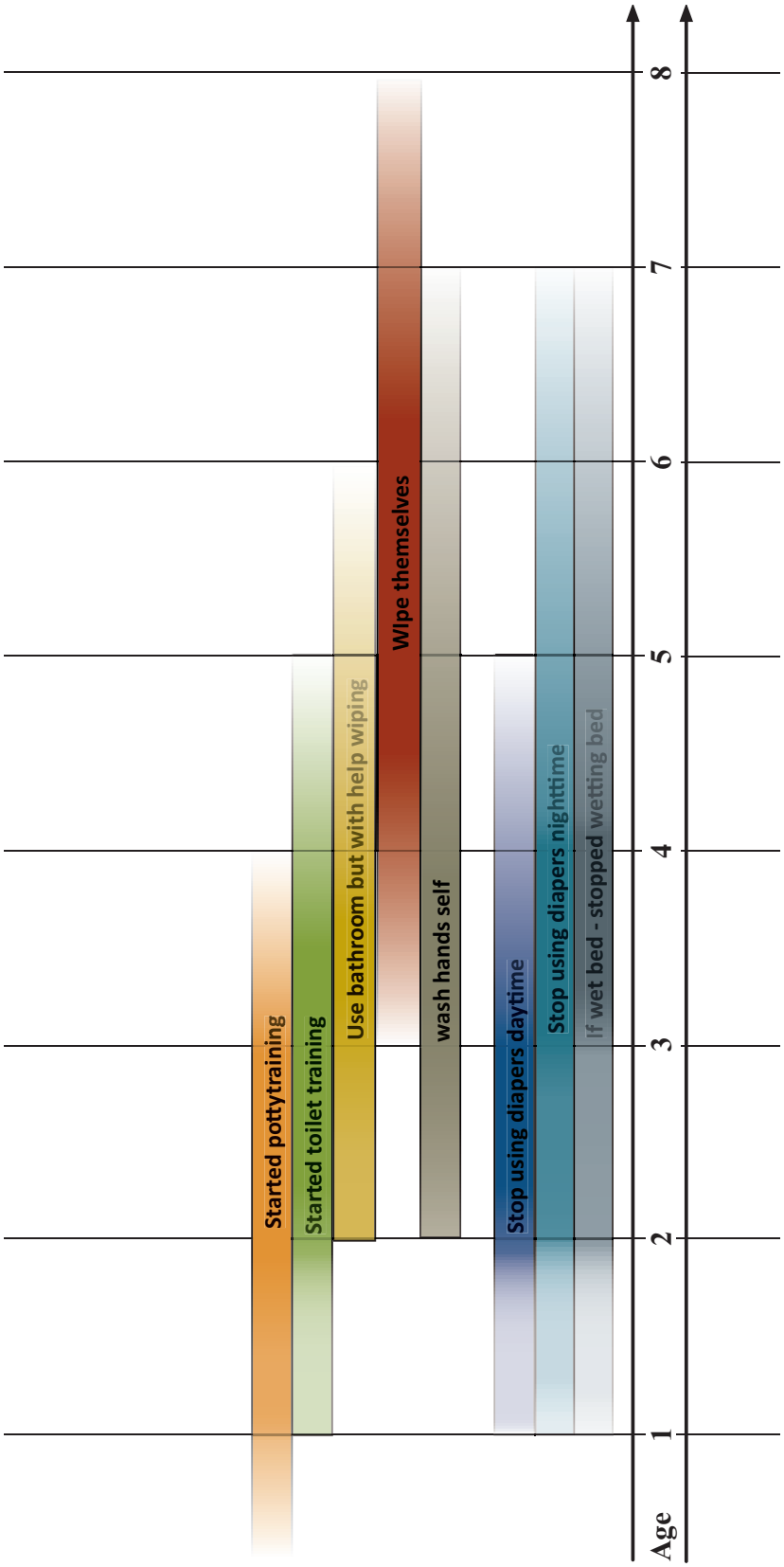

Figure 4. Timeline of hygiene development using results of questionnaire

5.3 Analysis and conclusion

The pre-study was mainly performed to get knowledge and understanding about the area children and hygiene. The literature study proved to be a good basis for the upcoming work and the result from the questionnaire mostly confirmed what was said in the literature. Both the literature study and the questionnaire showed that the age span circa 4-6 is suitable for this project since it is the age when the child becomes more independent and is eager to learn.

The result from the questionnaire showed that most problems occur within the areas hand washing and toilet visiting. Using the shower proved not to be an area of interest if the aim is to teach children hygiene. This is because by the time children learn to shower by themselves they have already been introduced to hygiene and have learned the basics of hygiene routines. Their first introduction to hygiene is when they are younger and about to learn how to use the toilet which is around 3-4 years of age.

The benchmarking showed that there are a lot of hygiene products for children already on the market. For example, products designed to facilitate the use of the bathroom or to help keep children clean as well as products designed with the sole purpose to make the toilet visit more fun. There are products on the market that are designed to facilitate within the three problem areas that the questionnaire showed which shows that reality reflects the result from the pre-study. For instance, there are soaps to help make the child wash their hands longer, wet wipes to help clean after bowel movement, and lastly there is one product on the market "Cottonelle" that aims to help children from taking too much toilet paper. However, almost all of these products can only be found in USA and do not suit the European market. Therefore, there is plenty of room for suitable child products for the European market.

There are many products for potty training on the market, even on the European market. Also within SCA they have products for this purpose such as Libero® Up&Go. This is one of the reasons why this project will focus on older children that are about to learn good hygiene habits in the bathroom.

6. User studies

With the knowledge and understanding gained about children and hygiene, a deeper study of washing hands and visiting the toilet was needed since these are the most problematic areas according to the pre-study. What are the needs and demands when it comes to children washing their hands and using the toilet? To answer this question different study and data collection methods were used (see chapter 4.1). This chapter describes the methodology, results and analysis of the user studies.

6.1 Execution

How the data collection and user studies (observations, interview and focus group) was executed is described below. The user studies have been carried out using the parents because children are not fully developed mentally and therefore cannot express themselves well, nor would understand the reason for the studies. Hence, apart from the observations parents have been the source of knowledge. The main method of acquiring participants to user studies was online parent forums. A membership was started on different websites and messages were posted asking for help with studies. However, for the direct observations the main approach was calling nurseries and day-care centres directly to ask for permission to come and observe.

6.1.1 Observations

Day care centres

Observations were made of children taking care of their hygiene in order to see problems and needs they may have. Day-care centres (förskola) for children between ages three and five (also sometimes called preschools) were contacted as well as classes (förskoleklasser) for children six to seven years old. This resulted in observations at two different day-care centres and one observation at a nursery. The observations took place in the bathroom so that the hygiene skills and behaviour could be studied and noted down. No or little interaction took place with the children during the observations. The observations took place before and after lunch as this is when there are most bathroom visits.

Child-minder's home

Observation at a child-minder's home was performed to be able to examine a child's behaviour and ability in a home setting. At day-care centres, the bathroom facilities are adapted to the children's size and so in order to be able to observe what kind of difficulties children have in performing hygiene activities in an adult bathroom, observations in a home setting was necessary. An experienced child-minder was contacted after having received her number from the administration office for child-minder's in the area.

Modified journal method

Nine parents performed observations on their child for two days. They filled in the form and answered the questions and then sent the form back to us. In the instructions, parents were asked to describe with as much detail as possible. (See Appendix B for the instructions that are in Swedish.) Some of the parents did this which was appreciated since it made the analysis of the answers easier while some had less detailed answers, which resulted in that a few interpretations had to be done. Follow-up questions were asked to some of the participants to get a better description, however, the answers were not very in-depth. The form that was sent out for parents to fill in also included structured interview questions to get information on their teaching of hygiene, use of child products and opinions on them.

6.1.2 Interview

An informal semi-structured interview was held with a child-minder in her home. It was the same child-minder visited for the observations. Some questions were prepared beforehand and some new questions came up during the interview. It was questions about how to teach children hygiene routines and what kinds of hygiene products she had used for her children and what she thought of them.

6.1.3 Focus group

A focus group was conducted consisting of 6 women, all of them mothers where two of them were professional child-minders and two were from SCA. Two fathers were booked to participate but did not show. Parent forums, personal contacts and notices on SCA's intranet announcement board were used to try and get participants for the focus group. Flyers were also placed in the nearby residential mailboxes to obtain a good amount of participants.

The aim of the focus group was to help get a basis for idea generation and further work. Subjects discussed were what difficulties children might have during hygiene activities (washing hands and going to the bathroom), what they feel about certain products on the market that aim to help children carry out hygiene practices as well as brainstorming some ideas of possible products (See Appendix D for the focus group guide which shows the execution of the focus group).

6.1.4 Needs analysis - question method

The question method was used to analyse the results of the user studies. The questions mention in chapter 4.2 were answered to help give systematic and deep analysis.

6.2 Results of user studies

In this chapter the result from the data collection are presented and analysed. The summaries of the data collected from the user studies can be seen in the Appendix.

6.2.1 Observations

At day care centres and child-minder's home

The observations showed different results depending on how many children the day care centres had. At the preschool with few children, an adult could watch all the children use the bathroom and wash their hands. Therefore the children were quite good at washing hands and using soap. A contributing factor may also be that there were less children sharing the wash basins and therefore easier for them to properly wash their hands. At the preschool with many children where no adult could be present, most children tried to avoid washing their hands after using the toilet. However, children that were older than 6 years old were quite good at washing their hands.

Most children washed their hands under water for a maximum of five seconds. Most of the children using soap did not rub their hands with the soap; they only put some soap in the middle of the palm and then rinsed it off without rubbing it in. The children who used soap tended to take to large amount of soap since it was fun to push the button many times. However, a soap that generated a lot of lather made the children wash their hands a longer time since it was fun to play with the lather. A problem in some nurseries was that most children took too much paper when drying their hands. (See Appendix E.)

Modified journal method

Four parents expressed that their child had difficulties with ripping or pulling off paper, mainly because it was difficult for them to reach the paper holder while sitting on the toilet seat. Many of the children stand when wiping since it is easier to keep the balance and reach the paper. Three of the parents said that it was difficult for their child to take appropriate amount of paper. This can depend on where the paper holder is placed or what type it is, however two of the three parents did not describe it as being so. One parent said that the child (just over three years old) did take an appropriate amount if she was there to instruct otherwise the child would take too much in order to defy her. The other parent explicitly said that the most difficult for their child (seven years old) to do was determining the amount of paper to take. The amount of paper that children take varies from two squares up to twenty when urinating and some children takes more or less than that when wiping after bowel movement.

Three children had difficulties with wiping clean after bowel movement and the other children had parents that wiped for them. The difficulties

with wiping clean after bowel movement is probably due to that their arm movements are not fully developed, especially for children under five years of age. One parent also expressed that even if the child is physically able to wipe her buttocks it is difficult for her to know if it is clean enough and she therefore wants her parents to wipe her even though she is able to do it herself.

Flushing the toilet was difficult for some children. The reasons for these problems were very individual. One child had difficulties reaching the button, another child had difficulties with remembering to flush and one child had difficulties with pushing the button all the way down due to the design of the toilet button.

All the participating households had pump soap, only two had bar soap as an option to the pump soap since their pump soap was more difficult for the child to use. Many children just rub the palms together back and forth to rub in the soap. Some do it more thoroughly and between the fingers. Most children rinse the soap off by holding the hands passively under running water and then dry the hands very quickly, for example, grabbing the towel once. Some hygiene routines, e.g. drying the hands after washing them, tend to go very quickly due to poor patience and an eagerness to go and play. But some parents expressed that if they remind the child, he/she usually does it right.

The result shows that many of these difficulties are the same through all the ages, which also is an indication of that even if the older children actually know how to perform the different actions in a proper way they will not do it due to either poor patience or just a resistance to do it right.

The last part of the form, the interview part, shows that most of the parents did not experience any particular difficulties with teaching hygiene, except for small problems with getting the child to wash its hands after using the toilet. Most parents taught their children hygiene by talking to them, explaining how and why, and encouraging them. Many also let their children imitate the parents and some parents pointed out that it is important to be consistent. It is also important not to talk too much about germs since it can make the child exaggerate its hygiene routines.

Most of the parents used products such as wet wipes, potties, mild products and a stool to make it easier for the child to reach up to the toilet and the wash basin. Some also used a toilet ring specially made for children's buttocks. Most of these products are made to physically facilitate the use of the bathroom for the child. Products that are made with the purpose to only make it fun seemed to be less popular. Some parents thought that it is easier to learn if it is fun while some parents thought that using the toilet does not have to be fun; it is just something you have to do. The parents expressed that products made for children must not contain any unhealthy material and they should be sustainable, robust and easy to

clean. Many parents want wet wipes that are possible to flush down the toilet. They also expressed that even if it is a product made for children it is important that it fits the bathroom environment; the product must therefore attract both children and adults. Some parents preferred permanent products that can be assembled if wanted.

6.2.2 Interview

The child-minder believes that imitation is the best tool for teaching children how to wash their hands since a child likes to do things the same way as an adult. Reading storybooks about hygiene is also a good way to teach them about hygiene. Problems she had noticed are that many children do not understand why they should wash their hands and many children wash their hands very fast and carelessly. The child-minder tries to teach the children to wipe themselves by letting them wipe with the first paper to see if it goes well. If it goes well they can continue by themselves under her supervision until they have learnt how to do it all by themselves.

The child-minder expressed that products made for children must not contain any unhealthy material or chemicals. She was very sceptical towards wet wipes as she suspects they contain a lot of chemicals. She rather uses disposable towels that she wets herself. The child-minder believes that using a set time limit is both fun and educational for children. Sometimes she uses an egg timer when, for instance, cleaning together with the children. She would however not buy a soap that plays music or products like that.

6.2.3 Focus group

The focus group gave insight into parents' attitudes towards hygiene and child hygiene products. (See Appendix F for a summary of opinions on child products.) To begin with, general questions were asked, and then the different actions when taking care of hand hygiene and toilet needs were listed. Here a few parents thought of issues not before thought of i.e. the checking of the toilet seat being up/down or clean/dirty. It was also realised that there are in fact many actions to do in sequence during visits to the toilet which one person commentated can be a lot for a child to remember.

Next, the difficulties a child might face when it comes to hygiene practices were discussed. There was much focus on what did not work very well, but probably because this is easier to remember and to talk about. The difficulties that arose in the focus group are the same as those seen in observations and in the questionnaire, those being: taking too much paper, difficulty wiping, careless hand washing and not drying hands enough. However, an interesting new aspect came up during these discussions, namely that some children sometimes feel anxiety when it comes to going to the toilet. A reason for this was thought to be the fear of "doing it

wrong". Some also mentioned that their children would take it to the extreme in order to "do it right" and therefore e.g. wipe themselves as hard as they could. Many felt that there has been a lot of talk about hygiene lately and that sometimes there is too much fuss about hygiene that they feel children may develop bacteria-phobia.

Afterwards, different child products that are designed to aid children either to physically carry out certain tasks or to help teach hygiene practices were shown to the group. There was a positive response to physical aids, for example a stool to help them reach the sink and a toilet ring adapted to them. These two products has some of the people used before and thought they were good. The pedal used to flush the toilet was also met with enthusiasm because it is hygienic not having to touch the toilet after use.

The other products such as SquidSoap®, Cottonelle® For Kids and so on, were for the most part met with dislike. Some mothers felt that they were "cute" or "fun" but most mothers felt that they were just "too much" and "American". A couple of parents also felt that hygiene does not have to be fun because it is a necessity and something the children have to do but it can be a good way to introduce them to the task because it can encourage and entice them to do it themselves. Some also thought that if a child uses one product too much or gets attached to it, they will be confused or helpless when they are introduced to something else.

The next section of the focus group was about teaching methods and approaches. They felt the best way to teach good hygiene is to be a good role model because kids imitate and emulate their parents. This is the classical observational learning that is common when teaching the coming generation, though this method is quite a slow process (see chapter 3.2). The other important method was communication with their child. Talking with the children and answering their questions was what the participants felt is the best way to teach why it is important with good hygiene. To encourage good hygiene practices and habits, reminders seemed to be the most used approach among the parents. They even mentioned that they remind so often that it is more like nagging. This shows the use of prompts to teach (see chapter 3.2). Here it shows that prompts are not the most effective behaviour modification method because it requires the parents to be available whenever the child uses the bathroom in order for them to trigger the correct behaviour. The parents also felt that encouragement and praise were good ways to reinforce a good behaviour i.e. when they were good at washing their hands or wiping themselves. All these approaches is through parent-child interaction.

Other ways to help teach children good hygiene habits that came up during the discussions was to make sure all the necessary products (e.g. toilet paper and soap) was always available as well as within easy reach to help ensure the child uses the necessary products every time and therefore better learns. There was also a mention that products with an appealing

appearance (or smell when regarding soap) could help in the teaching of hygiene habits as it also encourages children to use the products.
The last portion of the focus group was a brainstorming of ideas of products that could help teach hygiene practices. There were not many new ideas as many participants mentioned products that are already on the market but that they think are good e.g. foaming hand wash because "it is easier for kids" and soft paper so that it feels better when wiping. All the mothers also think wet wipes are very good for kids to use, especially after having used normal toilet paper to ensure they are clean. However, they all want truly flushable wet wipes as this would be a lot more convenient and hygienic.

During this portion of the discussion the participants also mentioned some factors they feel affect a child's willingness to use the bathroom and/or learn and those being that it is important the bathroom is clean and harmonious. Fun and enticing products was recognised as a good way to encourage children to use them, but they all concurred that it only works for a short while then they are not that fun and enticing any more.

Two new ideas came up during the brainstorming. To help kids take toilet paper as well as know how much to take, more visible perforations in the toilet paper could make it easier see how many sheets you actually take. One more suggestion was larger perforations to make it easier for kids to tear of the toilet paper. One idea for teaching hand hygiene was a substance that shows how much bacteria and dirt is on the hands or still on the hands after a careless hand wash. The purpose of this is so that children understand that they must wash their hands thoroughly. This type of substance exists and is actually used during the education of nurses to teach them proper washing technique, and so this could perhaps be applied to the general consumer market.

6.3 Needs Analysis and conclusions

Analysis and examination of the results from the user studies show three major areas that can be improved with the help of a product or products:

1. Taking appropriate amount of toilet paper
2. Properly washing hands
3. Wiping after bowel movement

These three problem areas have been recognised by others which is why there are products on today's market (mostly American market) that try to solve them. For example, SquidSoap® for washing hands thoroughly, Cottonelle® For Kids for taking appropriate amount of paper and wet wipes to help children wipe clean (see Appendix F for further descriptions).

These areas are more difficult the younger the child is because many of these difficulties are linked to a child's mental and physical development. Difficulty in wiping after bowel movement is mostly due to the under-

developed physical ability of the child as well as the underdeveloped fine motor skills in the hand required to wipe the area.
Not washing hands thoroughly enough is most probably due to restlessness and not fully understanding why it is important, according to parents in the studies. Restlessness is a problem at any age in the span 4-6 years because washing your hands is not as fun as playing. The restlessness leads to the hands being washed very quickly (approximately two to five seconds) and also often without soap. If soap is used, the child most of the time does not lather probably because he/she does not understand why. Furthermore, rubbing the soap takes time, so not doing this properly may also be due to restlessness. Perhaps some children may experience difficulty in lathering which may contribute to the poor use of soap. However, parents do not think that there is much physical difficulty in washing the hands and that the child knows how but does not do so because of restlessness. Nonetheless, in a few observations, it was seen that some had problems taking soap because of the container's design and placement which may in some cases be why the child does not use soap when washing. (See Appendix E for the observation.) It is like the parents in the focus group said; the tools must be readily available and easy to use if children are to use them.

Taking appropriate amount of toilet paper can be due it being difficult to rip of the paper. From the modified journal method, taking a good amount of paper was determined to be most difficult for three children and ripping off the paper was most difficult for three children. Ripping of the toilet paper is a contributing factor to not taking appropriate amount of toilet paper. And difficulty ripping of the paper can be due to physical limitations such as arm reach and fine motor skills. The placement of the roll in relation to the child and the type of hanger are major factors. If the roll is placed too far away or in an awkward place the child will have difficult handling the paper from the seat. The type of the toilet roll hanger can affect how the paper can be taken, e.g. ones that have a lid with teeth makes it difficult to roll out the desired length when the roll is relatively full because the teeth dig into the paper meaning the lid has to be held up while the paper is taken. The most simple toilet roll hangers (no lid) on the other hand sometimes means that child has to use one hand to keep the roll still while tearing it off with the other. Furthermore, no lid has the risk of too much paper rolling off because the child pulls too hard on the paper causing the paper to roll off uncontrollably. Adults have better coordination and motor skills not to mention more experience with toilet rolls than a child and can therefore roll appropriate amount and tear off with one hand. There can also be an added difficulty if the toilet is not equipped with a child adapted toilet ring because the child then has to hold themselves up with at least one hand while taking toilet paper. This often results in the child having to stand up while taking paper and wiping, which can lead to urine dripping on to floor or clothing.

Not understanding how much is an appropriate amount of toilet paper

can be contributing reason for taking too much/little paper. Children have not gained enough experience from trial and error (Shaping, see chapter 3.2) to know what is a good amount of paper to use. From the modified journal method, there were three children parents described as not having trouble taking paper but rather determining the amount. This shows that not understanding what is appropriate is also a problem. Even if parents tell their children how much is a good amount it may be difficult to remember as it is quite abstract for children to understand. There was however one child who knew how much paper to take because the parents had instructed him many times but still took too much paper in order to defy the parents. This is probably because the child was in the defiant age (see chapter 3.1, figure 2). The seven-year-old child had difficulty determining the amount which shows that without many reminders it can be difficult to know how much to take even at an older age.

Though needs for improvement have been discovered, the user studies show that parents overall do not experience toilet training as difficult or as containing any major problems. Even though the problems are common (most of the parents from the studies have at some point experienced these problems with their children, however to a varying degree) parents do not see it as a problem as they think it is perfectly normal: Every child needs to go though the difficulties before they can learn.

The children do not either experience these as problems either as they may not understand why they can be considered problematic. It was revealed from our studies that some children can however experience problems in the form of anxiety when it comes to toilet visits. Anxiety is a psychological issue that can have vastly different and complex causes and will not be further examined in this project.

The consequences of the revealed "problems" are normally minor but can lead to more serious consequences such as sickness. Taking too much paper leads to more toilet rolls being consumed which is neither good environmentally nor economical for the family. If a lot of paper is used there is also a risk of clogging the pipes in the toilet. Taking too little paper can lead to traces of excrement and/or urine to come on the fingers, which is then transferred to other surfaces and perhaps the mouth that can spread sickness. The same consequence can occur when a child experiences difficult wiping after bowel movement as this may also result in excrement traces on fingers that can be spread. Sickness can also spread if the child does not wash the hands properly since bacteria on the hands are not washed away and therefore can be spread. Sickness has the further implication that the parents must stay at home to take care of the sick child or they themselves get sick. Difficulty wiping can also lead to the area not being cleaned enough which can lead to the child developing a rash, which the parent must treat. Not washing the hands properly leads to the parents having to remind the child many times and checking that the hands have been washed which can be inconvenient and frustrating.

These consequences are minimised if parents help their child when it comes to wiping and hand washing. So in fact the "problems" occur mostly when parents are not available to help their child e.g. when they are at day care, preschool or school and are old enough to be able to take care of it themselves (approximately 4-6 years of age). The aim of this project is to develop a product that helps children learn good hygiene habits so that the children themselves can perform the activities adequately by themselves.

One common obstacle, however, in the independent learning and performing of good hygiene routines is that children are in their nature impatient and restless because playing is more fun than hygiene. Parents feel this is characteristic of children and the studies show that most parents do not think that anything can change that; hygiene will never be more fun than play, and if there was a fun hygiene product it would only be fun for the first time. And while some feel that a fun product could help a child learn, they feel that it would only work during the first couple of times. Hence, parents are a little apprehensive when it comes to child products that aim at being fun. Some also dislike "fun" products because they feel that hygiene practices need not be fun, it is a necessity. Many of our studies such as the questionnaire and focus group reveal that generally parents are also sceptical of products that aim at teaching hygiene. Many expressed that they themselves teach their children and that they do not want nor think a product can do that for them. This is important requirement for the products; that the products should facilitate the parents teaching and not be educational in themselves.

One other reason for the unpopularity of fun child products is that they do not like how they look (for example, loud colours and animated characters) and it is important to some that the product suit the bathroom environment which should be a calm and harmonious place.

Many expressed a liking for wet wipes. They feel wet wipes are easy for children to use in order to get clean, and reassures them that they are clean. Today, there are wet wipes that claim to be flushable e.g. Kandoo, however they are no longer sold in Sweden due to consumer complaints of pipe blockage as well as because the Swedish water and sewage department discourages the use of them.

The parents' most important demand on child products are that they are safe for children to use. Some use environmentally friendly products because they feel that if they are good for the environment they do not consist of dangerous chemicals that can be harmful to the child. So in the case of child products, eco-labels are seen as positive because many associate environmentally friendly products as safe. From the focus group many there based their purchases on the product being the right colour for their bathroom, a nice smell (soap) and price.

In conclusion, the three areas that have been shown to be the most problematic are taking appropriate amount of toilet paper, properly washing hands, and wiping after bowel movement. The reasons or causes for these are due to the child's not yet fully developed skills and restless nature. The consequences of these problems are mainly the spreading of sickness. The products developed to solve the problems should not be explicitly educational because parents want to be the ones who teach their children, in addition the products should not have the aim of being only fun since it is a very short term solution to the problems.

Part II
Product development

Part I of this report consisted of a pre-study and user studies which showed three areas to improve when it comes to children's hygiene routines. These three areas are: taking appropriate amount of toilet paper, properly washing hands, and wiping after bowel movement. Part II in this report will describe the product development process, as well as the result of the product development ending with discussion and recommendations.

7. Theoretical framework - Part II

This chapter goes through the theoretical framework for the product development part of the thesis. This includes areas of cognitive ergonomics such as perception, decision making, and mental models. Important aspects of the field of semantics is also presented here.

7.1 Cognitive ergonomics

Cognitive ergonomics is the field of human factors and ergonomics that concentrates on the cognitive processes during humans' interaction with products. Only relevant and applied theory of cognitive ergonomics is presented below.

7.1.1 Perception

People become aware of the information in the surrounding world by perceiving it through the senses. Perception is a process that organises the received stimuli and gives it a meaning. Hence, perception stands for how people think and understand their surroundings and how they remember things. How people perceive things is very dependent on what context stimuli are perceived in. What people perceive from the surrounding world is their own built up model and not an exact copy of it. (Osvalder & Ulfengren, 2008)

The selection and interpretation of the information depends on both inner factors such as needs, experiences, feelings and expectations, and outer factors such as size, contrast, intensity and frequency of the stimuli. Humans try to create a whole from the stimuli they perceive so that the stimuli is given meaning. This aim of giving meaning to raw sensory data (outer factors) is affected by the inner factors e.g. experience and expectation. It is because of this a course of events can be perceived in different ways depending on what earlier experiences people have. This can also be used to make the perception more efficient, e.g. if something is expected to happen the stimuli is perceived faster. However, if the person relies too much on beliefs and expectations the perception can be somewhat distorted. (Osvalder & Ulfengren, 2008)

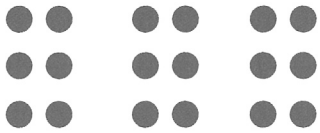

Figure 5. Illustration of the proximity Gestalt law

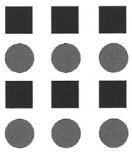

Figure 6. Illustration of the similarity Gestalt law

People try to create a whole from the stimuli as mentioned previously. And in order to achieve this the data is organised. This phenomenon is behind the Gestalt laws. The gestalt laws are a set of principles for how parts are grouped into a whole. These laws are used in all kinds of design (Osvalder & Ulfengren, 2008). Some of the basic laws are proximity and similarity. Basically they mean that objects that are is close proximity to one another are perceived as belonging together (figure 4). The same goes for objects that are similar in, for instance colour, shape, and size are seen as one group (figure 5).

As mentioned earlier, experiences affect interpretation of information and it is beneficial to use users' experiences to improve the interpretation of information. Cultural stereotypes is one type of user experience that can be utilised. Colour, for instance, can be used to code a message because of the user's cultural associations with the colour. However, it is very important to use colour with caution since people associate different colours with different messages across cultures and between individuals. In the western world the colour red is often associated with stop, danger, hot or fire while green often is associated with OK, drive, proceed or on. Also when describing a direction, cultural stereotypes should be taken into consideration. A direction up or right is often associated with an increase and down or left with a decrease. A movement clockwise often represents an increase and counter-clockwise a decrease. (Osvalder & Ulfengren, 2008)

7.1.2 Mental models

A mental model is an internal representation of a system or a reality. Mental models are created to simplify and predict different behaviours in the surrounding world.

The information on a product shall if possible resemble the information that is described, i.e. the variable that is described should be illustrated using user's mental model of reality. For instance, if a product should present the temperature it can be illustrated by a thermometer that shows the values like a real thermometer. If information is presented in this way it is easier for the user to interpret the information by relating it to the mental model that he/she has.

(Osvalder & Ulfengren, 2008)

7.1.3 Decision making

Decisions are behind every action and each action can vary from completely automatic actions beyond the consciousness to completely conscious decisions. That is, humans react to things in different levels of consciousness. The Danish professor Jens Rasmussen, describes three levels of behaviour. The three levels are called skill-based, rule-based and knowledge-based behaviour.

Skill-based behaviour is more or less an automatic action where the human reacts directly to perceptual signals. On skill-based level, actions are performed unconsciously and often as routine such as flushing the toilet after having used it. On rule-based level, actions are instead controlled by rules, routines, and earlier knowledge. Rule-based behaviour appears in familiar situations which the human is trained for and has thereby developed rules for. In these situations the human recognises the signs from early experiences. When a situation is new and unfamiliar without rules to lean back on, knowledge-based behaviour appears instead. Actions on

a knowledge-based level require active thinking and problem solving. An example of this is when you have bought a new technical product that you are trying to use. Knowledge-based decisions require much effort because they require the persons full mental capacity to solve the unfamiliar situation. This is also why knowledge-based actions are most likely to be wrong or inappropriate.

The three levels of behaviour can appear more or less at the same time. To be able to perform an action at a rule-based level, actions at skill-based level often have to be included too. Performing an action at a knowledge-based level often requires both rule-based and skill-based actions. However, there is no clear line between the different levels. It depends very much on the individuals training and attention. Tasks that one person can perform at a skill-based level, another person needs to perform at a knowledge-based level. However, if a rule-based action is performed many times it will eventually develop into a skill-based action and the rules that were used earlier will disappear. The actions will then become a routine and no active thinking about how to perform the task will be necessary.

(Osvalder & Ulfengren, 2008)

7.2 Physical ergonomics

Physical ergonomics is concerned with physical aspects of human-machine interaction. This field was not very applicable in this thesis apart from an exploration of the anthropometric aspects of the interaction.

7.2.1 Anthropometry

When developing a workplace or a product it is important to take all the different sizes of users into consideration, so that the designed products fit the users' physical dimensions. This is done by using anthropometric data i.e. measures of the human body, proportions, body postures, reach, movement space etc. Computer programs such as JACK are tools to help with the examination of anthropometry in relation to workplaces/products. The anthropometry of the different users are considered and depending on the users, different percentiles are usually used. When designing a product to be used by all kinds of people, usually a 95 percentile man and a 5 percentile woman are used as guidelines (depending on the application). A 95 percentile man is a man with large dimensions because 95 percent of the population falls below his dimensions. (Osvalder & Ulfengren, 2008)

7.3 Semantics

The design of a product is a sign and this sign carries a message which the user interprets. Semantics is the study of the signs' message. Monö (1997) describes semantics as having four different functions: to describe facts, to express properties, to exhort action and to identify e.g. origin and kinship.

7.3.1 Description

A product's gestalt, the total form, colour, surface structure and so on, is a sign that describes the product's purpose and function. Even if a product has quite an unusual design in both appearance and function it is usually recognised due to certain characteristic features. For instance, a water tap with an unusual design is still recognized as a water tap due to the characteristic features for a water tap; a bent body aiming towards perhaps a sink, an opening in the end to allow water to come out and one or two taps for turning the tap on. (Monö, 1997)

7.3.2 Expression

To describe a product's expression, words similar to those used to describe a person are often used. It can be words such as friendly, quiet, inviting, aggressive, happy or playful. A product can express something both by its appearance and its function. By small adjustments in a simple form an object can obtain a certain expression. An object can for instance express stability by giving the object a base surface that is wider than the top surface (figure 6B). The object is perceived as stable because experience tells us that it is difficult to overturn an object like this. On the other hand, an object that has a recessed lower edge which creates a shadow along the sides (figure 6D) makes the object look lighter. An object with bevelled edges (figure 6C) looks compact and closed perhaps because it reminds of a circle. The circle is the form that is perceived as the most dense due to that it has a central point to which each and every point on the periphery is equally related. An object with irregular shapes and different heights (figure 6E) usually express flexibility due to that it seems able to adjust to different space requirements. (Monö, 1997)

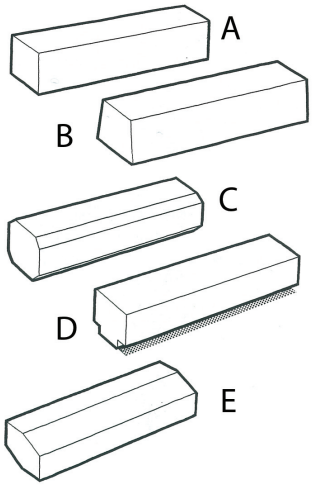

Figure 7. Illustration of how different expressions are achieved (Monö, 1997)

7.3.3 Exhortation

An exhortation is the message that a product signals. Exhortations can be perceived by all senses and is often formulated in text, coloured lamps, figures and so on. It is important that the exhortation is used in the right situation or context in order to trigger the intended behaviour of the user. The exhortation must be clear and unambiguous in order to direct the person to the intended action without confusion. (Monö, 1997)

7.3.4 Identification

Another word for identification can be likeness. One can identify and recognize a product due to the likeness it has with other products in a product range or products from a certain manufacturer. If a company maintains a consistent design strategy the products will get recognised through product generations and the origin will be easily identified.

A logotype, product name or other trademarks can also identify a product's origin. When choosing font for the text on a product or a logotype,

the readability, the purpose of the product and the nature of the company profile are factors that are important to take into consideration. Another way to achieve identification is to use colours. Colours can be used to identify the purpose of the product. Products made for kitchens and bathrooms are for instance often white due to that the colour white is associated with cleanliness which is an important aspect for these kinds of products.

A product can also be identified by its affiliation to other products in a product range or a product family. Monö (1997) explains the term product family as follows: "The term 'product family' is used for a group of products with one or more common properties which have the same principal purpose but different functions" (p. 109). The products in a product family usually have common characteristics in their form language, patterns, colours or functional properties.

8. Methods - Part II

This chapter describes the methods used during the concept development. The methods are divided into ones used for idea generation, analysis, evaluation and visualisation. Some methods can be seen as having two kinds of purposes, for example, Eco-design Strategy Wheel is both a tool to help idea generation and as a checklist for evaluation. The division in the following chapter is based on how the method was primarily used in this thesis.

8.1 Idea generation

Idea generation methods were used to help the creative process. Some of the methods were adapted to better suit this project and are described in the following section.

8.1.1 Brainstorming

Brainstorming is a very common and easy to use method for generating ideas that is usually performed in groups of 6-8 and one person leads the session. However, smaller groups can still use brainstorming with success. The core of brainstorming is divergent thinking without limitations and restrictions. Ideas should not be criticized so as to not inhibit creativity and so that people feel free to come with outrageous ideas. (Osvalder et al., 2008) One of the advantages with brainstorming is one can quickly and quite easily express one's ideas verbally ensuring that an idea gets shared and not lost in the fleeting moment. In addition, an idea does not have to be so clearly defined to be able to be expressed to the group, who can then help develop the idea. Brainstorming is a good foundation for further idea generation methods because a brainstorming session usually leads to some idea trails that can be used for further idea generation.

8.1.2 Sketching

Brainstorming gives a good basis for more individual idea generation in the form of sketching. Ideas can be visualized and in this way can lead to other ideas and so on. In this project, after a period of time sketching, the ideas were discussed and elaborated, which helped further brainstorming. Then a new session of sketching was started. A similar more structured method is called brainwriting, which is when the participants pass the paper around to allow others to develop the ideas further. However because only two people were sketching this was unnecessary since one looks at the other person's sketches anyway without having to change paper.

8.1.3 Brainstorming with images

There are many methods which use images to help the creative process; however, many of them are structured sessions with a group of peo-

ple. The idea generation sessions in this stage were only done within the project group consisting of two people so there was no need to use such structured method. However, the use of images from magazines etc. was used to help the creative brainstorming process.

8.1.4 Stimulus analysis

Stimulus analysis is a method used to help generate ideas by looking at different objects' characteristics. When the problem has been formulated and written down, ten different objects that have nothing to do with the problem are picked out. Each object's characteristics (functional, aesthetical etc.) are then written down and used as stimulus in order to generate ideas/solutions to the problem. This procedure is repeated until you have a satisfying amount of ideas for further development.

8.1.5 Imageboards

Imageboard is a method used to get inspiration in the design. Pictures are put together to create the right feeling that the final product shall express. It could be pictures of other products, environments, colours and materials.

8.1.6 Persona

Persona is most often used as part of a user-centred design process and is a tool to help get a better idea of the target users by creating a fictional character that fits into the product's target group. Persona describes the user's characteristics in relation to the product that the user shall interact with. Personas are useful during the idea generation step as a way to help guide decisions about a product, such as features, interactions and visual design. (Osvalder et al., 2008)

8.1.7 Eco-design strategy wheel

The eco-design strategy wheel is a helpful tool for generating new ideas that will lead to an environmentally friendly product. (See figure 7) The wheel consists of major parts in a product's lifecycle that affect it's sustainability, and so in this way it can also be used as guide or checklist for evaluation. The wheel can be used several times during the development process. The eight steps are as follows:

1. Optimise the function

The focus should be on the function not a product. One classic example of this is replacing a product with a service, e.g. voicemail instead of answering machines. Function can also be optimised by perhaps integrating many functions into one.

2. Minimise environmental impact

Designing a product in order to reduce the environmental impact could be done by for instance using a mechanical function instead of an electronic. Re-using permanent components instead of using disposable packages is also one approach or perhaps by having a clear and unambiguous design in order to prevent failures.

3. Minimise the amount of material

By reducing the amount of material on a product the transportation volume could be minimised which in turn makes it possible to transport a larger amount of the product which is better for the environment. Reducing the amount of material can also be done by making a timeless design or a design that is possible to upgrade in order to maximise the product's length of life. Using standard components and recycling materials is also preferable.

4. Choose the right material

By choosing the right material, e.g. avoiding any poisonous materials reduces the environmental impact. One should also avoid materials with limited recourses and the materials used should be recyclable.

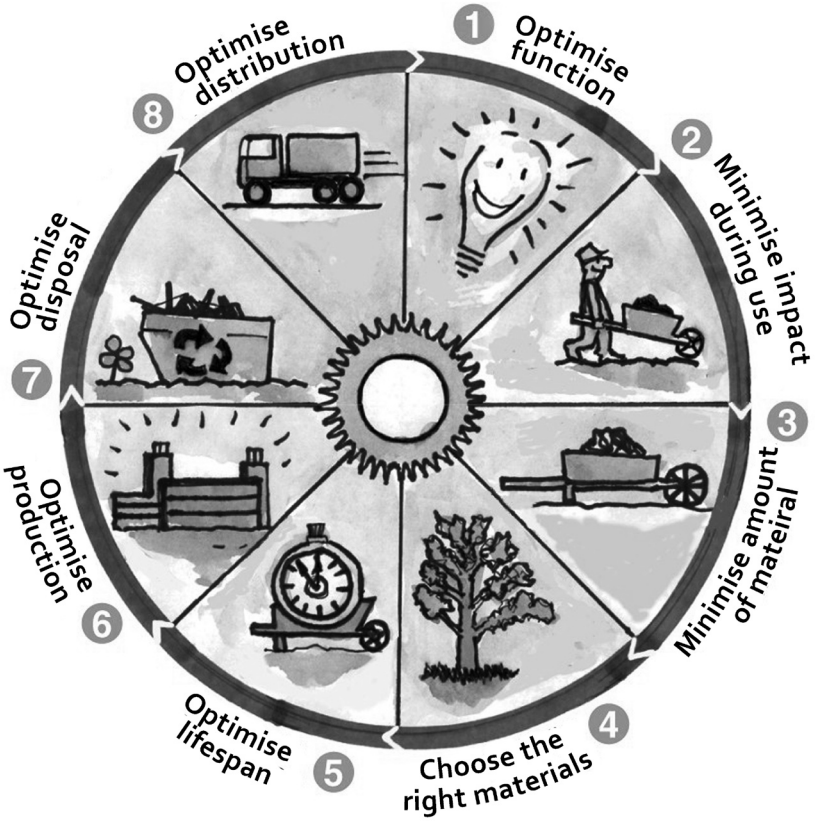

Figure 8. The eight steps of the Eco-design Strategy Wheel used to help idea generation and as a checklist for evaluation (Norrblom, 2000)

5. Optimise the life-span

There are several approaches to this. Extending the technical length of life, or by identifying and correcting weaknesses in the construction and design so that the least possible maintenance is needed. One simple approach is to ensure that the design is timeless so that the aesthetical life-span is longer than the technical.

6. Optimise the production

The technique for the production should be chosen with respect to the environment e.g. choosing the technique that is the least energy intensive and reduces the number of steps in the production.

7. Optimise the disposal

Optimising the disposal can be done by for instance making a classic design of the product to make it attractive for a second hand user or to make it easy to disassemble and to use recyclable materials.

8. Optimise the distribution

IKEA is a good example of this since their products are delivered in parts which are packed as compact as possible and are thereby easy to transport. It is also important to choose the best means of transportation and to carry large quantities.

8.1.8 Morphological analysis

The term morphology means the study of form and the method morphological analysis is used to structure and arrange parts of an object to create a whole. Possible solutions to a problem are systematically defined and tested. The problem is broken down into different components which are then combined in different ways to create multiple combinations of these components. The method can be used to explore new and different ideas and to force a different way of thinking. It is a helping tool in the problem solving work in order to find all alternatives and can also help you to move forward when you get stuck in the idea generation. The steps in a morphological analysis are presented below.

1. The problem is defined.
2. The different features or functions that are essential to the product are identified.
3. With 2-3 different features or functions a morphological diagram is made. With more than 3 features the different features are put in a matrix.
4. Each and every combination is systematically examined. The combinations can also be modified or further developed in this step.
5. The most promising alternatives are then chosen for further development.

8.1.9 Vector graphics software

Adobe Illustrator CS3 is a vector graphic programme which was used in the project. It is a programme suitable for creating logotypes and illustrations. The programme can also be used as a tool during idea generation in order to easily try out different shapes and compositions. The shapes and compositions can be copied and altered slightly which helps to generates many design concepts quickly.

8.2 Analysis methods

Methods such as user profile and JACK were used to help analyse user aspects that are important in concept development.

8.2.1 User profile

User profile is a method used to present data from user studies. A user profile contains information about the user's mental, physical and demographic data. It also contains other characteristics about the users that are interesting for the study such as profession, competence and if other requirements are fulfilled for a certain work. A user profile can also describe relations between different users. The aim with a user profile is to define which aspects of the user affects the interaction to later be used as a basis for the upcoming design work. User profile should be created at an early stage in the product development process. Users can be classified into four different kinds: primary users, secondary users, side users and co-users. These can also at times be useful to define in terms of use rather than users. This because user's can be two or more types of user's at the same time. (Janhager, 2005)

- Primary use: Use of the product for its primary purpose, for instance brushing teeth with electrical tooth brush.
- Secondary use: Uses or interaction with the product but not for its primary purpose, for instance charging the electrical toothbrush.
- Side use: An indirect interaction with a product (being affected by a product), for instance the noise from the electrical toothbrush.
- Co-use: The cooperative use of the product meaning the co-operation with the person using the product but not directly interacting with the product. For example, the sharing of the wash basin while the electrical toothbrush is in use.

Co-use is sometimes difficult to define depending on the type of product. Most common uses are primary, secondary and side.

8.2.2 Computer manikin - JACK

To get a better understanding of the ergonomics when designing products a simulated environment can be of good help. A simulation that concerns the aspects of the human body is usually performed in a computer

program aimed to visualize and simulate ergonomics where a computer model of a human is used. This model of a human is called computer manikin. The programme used in this project is called JACK and is one of the most advanced computer manikins. The program is mainly used to evaluate different ergonomic aspects early in the product development process before a physical model is created. The manikin can perform different movements and postures and at the same time be analysed ergonomically e.g., load on the spine or field of vision. The anthropometry of the manikin can be changed, meaning the manikin can be created in different genders, ages and sizes to be able to try products and workplaces for people with different body structure or of a certain target group.

8.3 Evaluation methods

The methods used to evaluate ideas before moving to a next stage of the process are explained in the coming part.

8.3.1 Questionnaire

Questionnaires can be used not only as a method to collect data but also as an evaluation method. Sending out a questionnaire is a good way to evaluate the ideas and to get opinions and attitudes from potential users and people outside the project by asking questions about the ideas by using different rating scales etcetera. (See chapter 4 for more in depth information on questionnaires)

8.3.2 Pros and cons

The pros and cons method is a very simple method that can easily be used any time to evaluate different ideas or solutions to a problem. It is a way to compare different solutions with each other. It can be parts of a solution that are compared or the entire solution. By discussing the ideas, the most serious disadvantages and the largest advantages with each solution are identified. The solutions are then improved by generating ideas about how to eliminate the flaws. Finally, the ideas are screened and valuated to find the best idea for further development.

8.4 Computer-aided design

Today there are many computer programs that have opened certain possibilities in design, ranging from tools to help with 2D graphics or 3D modelling.

2D graphics

As mentioned earlier vector graphics software Adobe Illustrator CS3 was used in the project. It was also used to illustrate concepts and figures in the project. Imageboards were made in Adobe Photoshop CS3.

3D modelling and rendering

Alias® Automotive 2010 is a 3D surface modelling software that was used to model the concepts. Bunkspeed Hypershot is a real-time rendering software that was used to render the images of the 3D models.

8.5 Mock-ups

Mock-ups of the concepts were done to give other a better idea of the size, proportions and feel for the concepts in real life. The 3D model of the soap concept was printed using FDM (Fused Deposition Modeling). Mock-ups of the toilet paper concept was done by using a photo printer to print on tissue. The tissue was glued onto overhead projector sheets and fed through the printer. The tissue was then glued onto a toilet roll.

9. Idea generation

After having found the needs, the next step was to try and determine how and with what types of products these problems could be improved and then choose which direction to continue in. This chapter describes the execution, results, and conclusions of the idea generation and evaluation.

9.1 Execution

To help determine which products can help fulfil the needs, ideas were generated. Idea generation methods described in chapter 8.1 were used within the project group.

The initial idea generation gave rise to various ideas and directions whereby the conceivable ideas with potential were chosen for further evaluation and development. This was done with the help of questionnaires made in a program called Easy Research. Two questionnaires were constructed where one questionnaire was for the public and one within SCA. The public questionnaire did not contain any ideas due to confidentiality, but rather examined people's attitudes and habits to help decide which direction to go. The other questionnaire helped evaluate the ideas more directly.

The questionnaires were done in a program available at SCA called Easy Research. This program was used because pictures were to be included in the questionnaire, something that is not possible in Google Forms. Parent forums were again used to spread the questionnaire. At SCA the questionnaire was sent to departments that do not work with product development to try and better replicate reality. (See Appendix H for the questionnaires in Swedish.)

9.2 Result

By using the methods described in the previous chapter and by studying existing products on the market, ideas were generated within each improvement area. The ideas and the evaluation of those ideas are presented below. (See Appendix G for a selection of sketches from idea generation.)

9.2.1 Improvement area I

Quite early on it was recognized that the physical factors for taking too much/too little paper cannot be changed. For example, everyone's toilet roll hanger and the placement of it will be different. For these reasons, creating something that would help the child tear of paper would be difficult. In addition, those types of products (if they are to be good and effective) would be expensive and since many parents do not feel that it is a problem, many would not see it as worth buying. Therefore, after having determined this after some brainstorming, ideas were concentrated on helping the child determine how much paper is appropriate.

In the modified journal method, a question was asked about how much paper the child takes. Most parents answered this question by explaining how many "squares" their child take, e.g. "my child takes four squares when wiping after peeing". By squares they mean the area between the perforations of the paper. This way of explaining the amount of paper seemed quite pedagogical and a useful way to describe amount. It is good to use users' mental model and therefore this was developed further.

This resulted in three different solutions with the concept of counting squares. The idea behind them is to make it easier for the children to perceive how many squares of paper they take. Today, children have to use knowledge-based decision making to determine how much paper they will take, however this does not work because they do not have enough knowledge or experience to make that decision. To make it easier for them to take the right amount, the decision could be made into a rule-based action. (See chapter 7.1.3 for more information) Rules are the fastest way to learn (see chapter 3.2) so by giving parents a way to give their child a rule to follow, it will speed up learning. The concept of counting squares gives parents this tool. The right amount of paper is not any more something abstract but a concrete number of squares. The parents can tell their child how many squares to take and the child can easily execute the rule. Four- to six-year-olds can normally count a few numbers, and this concept also gives them a chance to practice. In addition, the literature study shows that six-year olds like counting (see chapter 3.1 figure 2).

The three best solutions on this concept are described. The first is a paper dispenser which will give a discrete clicking sound for each square that is pulled out so that the child can count each clicking sound and thereby count the squares. Next idea is to have a separate picture on each square so that the child can count how many pictures to take and thereby count the squares. And finally a paper with clearly shown perforations e.g. coloured perforations, so that the squares are clearly visible and thereby easy to count.

Summary of the ideas for solving problem area I:

- A discrete clicking sound for each square that is pulled out
- A separate picture on each square
- Clearly visible perforations

One other possible solution to this problem area could be having paper sheets instead of a toilet roll, thereby eliminating the problem of taking appropriate amount of paper. See figure 8 for sketches on some of the ideas.

Figure 9. Sketches of ideas for improvement area I

9.2.2 Improvement area II

To solve the problem with not washing properly the ideas could be divided into two main ideas; facilitate the lathering of the soap (to avoid children just placing a click in the palm and rinsing) and help ensure the

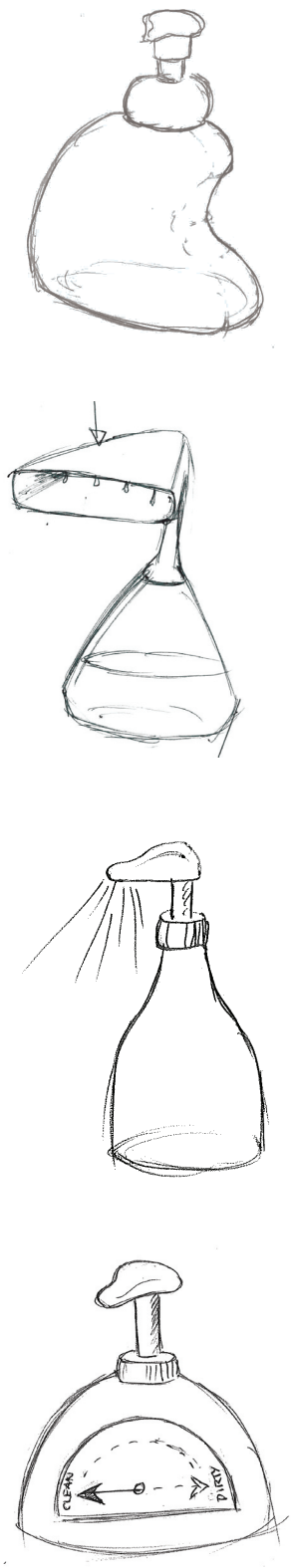

Figure 10. Sketchesofideas for improvement area II

child washes an appropriate amount of time. Preferably both problems be solved to make sure that a very thorough hand wash is achieved, but for the idea generation the two problems were formulated separately. Though parents pointed out that children may not know why it is important to wash their hands and therefore do not wash properly, it is not something that was examined. Parents want to be responsible for the teaching and this is a subject that is best taught by them. Hence, the ideas concentrated on the practicing of the routines; lathering the soap and washing the recommended time (20 seconds (www.1177.se)).

Ideas for improving lathering ranged from improving coverage to the use of colour. Why children do not lather their hands properly when washing may be due to them not understanding why, it being boring to lather, or it being difficult to lather. Since the teaching of the importance of hygiene is the parent's responsibility the two other factors could be dealt with. To make it easier to lather spreading the soap can be one solution. One idea was to get the soap spread over a larger area of the hand by spraying it over the hand when pushing the pump button. This will encourage the child to rub and rinse the whole hand and not just rinse off soap from one spot of the hand. Another similar idea to was to make the soap come on both sides of the hand and not just the palm when pushing the pump button. There were also two ideas using colour to help improve lathering. One idea was a coloured soap that will not disappear until the hands are rubbed and rinsed thoroughly. Another was a soap that comes out in two different colours which the child should mix into another colour by rubbing the hands together. The colours make it more fun for the children to properly lather and will make them want to wash their hands for a longer time.

Since most children wash their hands too quickly, an idea was to have a soap dispenser that shows the correct time needed for a proper hand wash. The Swedish medical care hotline (www.1177.se) recommends to wash the hands for at least 20 seconds. This time could be shown as an hour glass or an indicator that will start once the pump button has been pushed. The time could also be communicated through a sound that is given after a certain time. The aim of this is to give the child a clearer goal so as to encourage them to continue washing longer. The child-minder liked to use timers to get the children to perform an activity e.g. cleaning up because the children think it is fun. In addition, children of the age of six according to literature like time-keeping (see chapter 3.1 figure 2).

The timer also will give parents a way to give the children a rule to follow, such as "wash your hands till it beeps". As mentioned in chapter 3.2, rules give fast and effective behaviour change. In addition, if children follow the rule many times the actions become so routine that washing hands eventually becomes a skill (chapter 7.1.3). See figure 9 for some of the sketches of ideas solving improvement area II.

Summary of the ideas for solving problem area II:

- Soap that spreads over a larger area of the hand
- Soap with colours that encourages lathering
- A soap dispenser that will show the time of a proper hand wash

9.2.3 Improvement area III

Problem area III appeared to be more difficult to solve since one of the major reasons for this problem is the lack of children's physical ability to wipe properly. However, even if the problem is impossible to solve completely in a realistic way one can at least make it easier for the child to get clean when wiping. A way to facilitate cleaning could be to use wet wipes. Wet wipes are already on the rise on the market and an idea was to facilitate the use of wet wipes and make them more accessible for the child. This could be done by integrating wet wipes in the regular toilet paper holder or a separate wet wipes container that is assembled on the toilet paper holder. A wet wipe dispenser could also be assembled onto the toilet seat to make it easy to reach for the child. See figure 10 for some ideas for solving improvement area III.

Summary of the ideas for solving problem area III:

- Use of wet wipes
- Facilitate the use of wet wipes by making them more accessible
- Integrate the wet wipes with the regular toilet paper holder

9.3 Evaluation

The ideas described earlier are the ones that were determined from a pros and cons evaluation to be the ones with potential. The ones that had potential were then evaluated with the help of two questionnaires; one public and one within SCA. The questionnaire at SCA helped evaluate the ideas more directly. Due to confidentiality the public questionnaire did not contain any ideas instead evaluated products on the market today to get an indication of people's attitudes. Since the user studies aim was to find the needs, it was determined that more knowledge on attitudes, preferences, and habits on the areas of toilet paper, soap and wet wipes was necessary. Without more information there would not be a good basis for the requirement specification (see chapter 10.2.4 for the public questionnaires result and chapter 10.3 for the demand specification). The following section describes the results of mainly the SCA questionnaire with regards to the evaluation of ideas. Major insights from both questionnaires are presented below because of the impact it had on the further development.

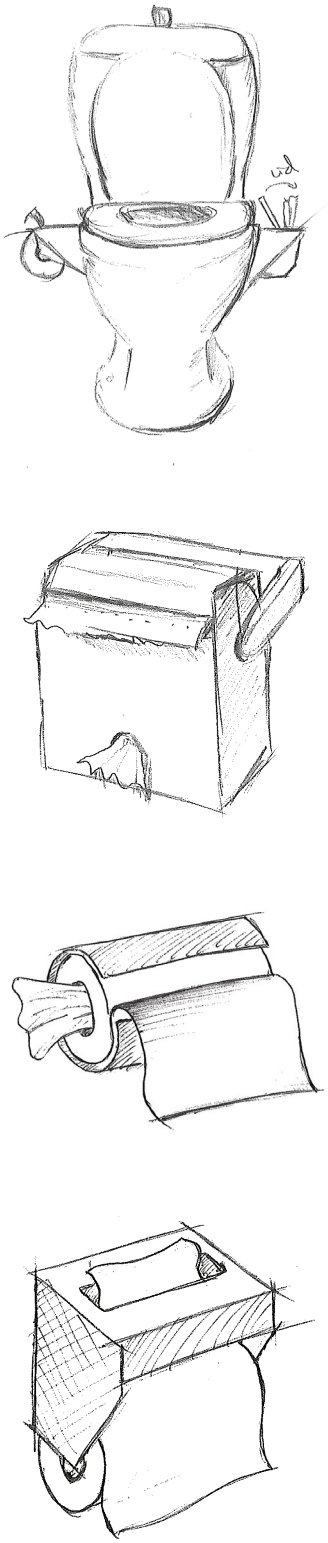

Figure 11. Shows time for proper hand wash

9.3.1 Questionnaire results and analysis

Both questionnaires, public and SCA, received a total of 178 responses. (The public questionnaires' result chapter 10.2.4.) The questions re-

garding wet wipes showed that most people do not use wet wipes at all (see figure 11). Quite many though use wet wipes for other purposes than wiping after toilet visits. The results also show that even if the wet wipes were flushable only a small percent would buy them. This might be because people do not associate wet wipes with toilet visits. There were some comments in the questionnaire by people wondering why you would want wet wipes by the toilet. This shows that their mental models (chapter 7.1.2) of wet wipes does not include wiping after toilet visit. Even though some parents from the studies said that wet wipes are very good, the questionnaire showed that majority of parents do not use it for this purpose.

Due to these results, and the time available for this project it was decided not proceed with the wet wipes idea. The project aim was to develop products that facilitate the teaching of hygiene routines. Since many do not even associate wet wipes with toilet visits, effort would be needed to change attitudes and introduce a whole new type of product. In addition, the idea is somewhat outside the scope of the thesis. The project aim was to develop products that facilitate the teaching of hygiene routines. Wet wipes do not teach the child how to wipe but is rather a tool to help clean. The soap idea and the toilet paper idea is more appropriate for this project because of the learning aspect to the soap and the paper since they are about understanding time and amount.

Regarding the other ideas, most parents liked the toilet paper idea with a picture on each square to make it easier for the child to understand the amount of paper they should take. They thought children would enjoy

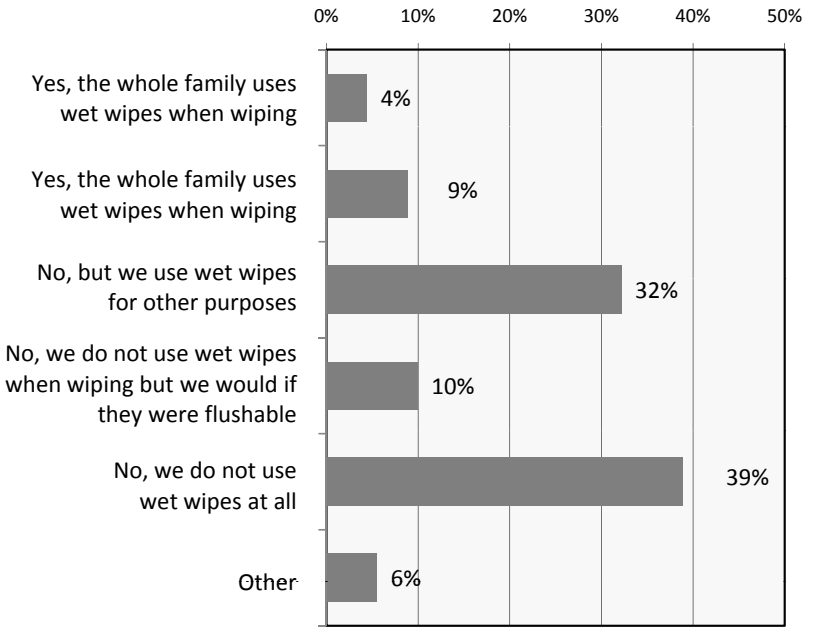

Figure 12. Questionnaire result: Do you use wet wipes for wiping after toilet visits?

that and it could probably work even if they have not learned to count yet. Clearly shown perforations were also considered to be a quite good idea. The idea with having a sound was not popular though, as many said that it could be irritating. In addition, it was not considered to be as fun as the idea with the pictures. (See Appendix I for charts of the responses.) Cottonelle® For Kids was not liked because it does not allow one to adapt the amount of paper; everyone has to take the number of squares it shows. Some also feel that it was a trick to get one to use more paper than necessary because the paper shows to take five squares. Some also commented that the design was ridiculous and ugly.

Regarding the idea with a soap that will get children to wash their hands more carefully it was the spray soap that got the highest score. To use colours in the soap were not popular since many parents suspected it to be unhealthy due to the risk of allergic reactions. Many parents also thought it would get messy if the children would play with the coloured soap. (See Appendix I.)

A picture of a soap that blinks for 20 seconds after pushing the pump button was shown in both of the questionnaires. This soap pump is shaped like a hippopotamus head and is called Huggies Clean Team Foaming hand soap. It was discovered later in the project and therefore not used in the user studies such as the focus group. The child is to wash the hands as long as the lamp on the pump button is blinking. The opinions about this type of product were mixed. Most parents liked the idea with a soap that shows the time needed for a proper hand wash. However, some did

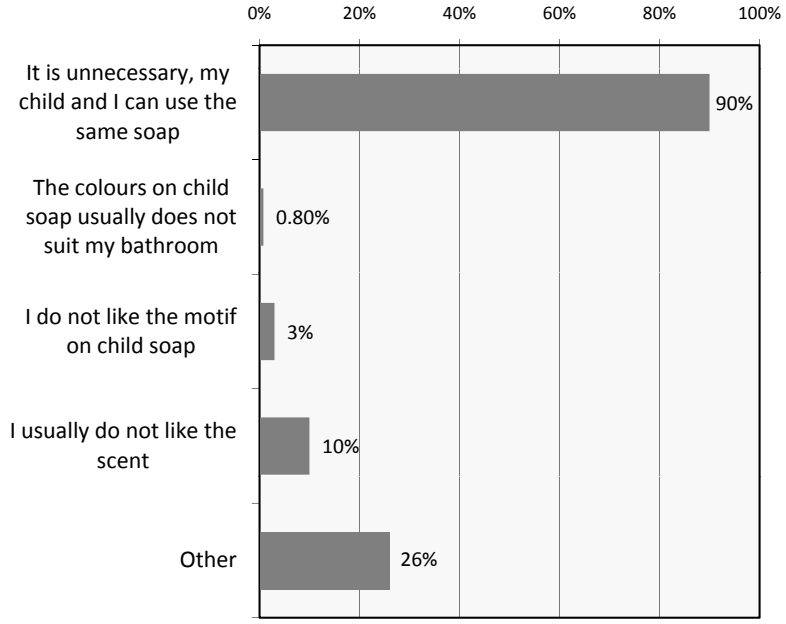

Figure 13. Questionnaire result: Why do you not buy hand soap designed for children?

not like that it contained batteries and wondered if the batteries could be changed due to environmental impact. The following question asked what they thought of a product like the hippo soap but without the damaging environmental impact. The opinions were then majority positive. One question revealed that environment issues was the third most important criteria when buying soap.
The idea of having a discrete sound instead of something visual to indicate the time was again not popular since you cannot choose to avoid hearing the sound. In addition, there are already too many stressful sounds in everyday life like the phone ringing or the sound from the microwave and so forth. Evidently, time should be shown visually and not audially.

A very important aspect that the questionnaire showed was that the products should not target children. The reasons for this is that most parents would not buy a separate product for their child and in return would not want to use a child product themselves. Not wanting to buy a separate product applies mostly to products that everyone in the family uses such as soap and toilet paper. They feel that it is unnecessary and that the child can very well use the same products as the rest of the family. (See figure 12.)

That most adults would not like to use a soap that looks childish was evident in the question where they were asked to rank six different soaps on which they would most likely buy, supposing they have a three year old child at home. The soaps that got the highest rank were those who did not aim directly towards children but those who had a more neutral appearance. The soap that was ranked lowest was the one that had a very childish design (see Appendix I). If adults do not want to use a child soap and majority would not buy a separate product for their child, then it is not worthwhile developing a child product.

Regarding opinions on products that are to be used by children and aim to appeal to children, the opinions were somewhat more negative: 41% said that they did not like child products, 33% said that they think they are good, and 26% did not know. Majority of respondents left comments and these showed that there were more strong feelings against child products than those positive towards them. The reasoning for why child products are good were mostly concerned with that child products are often more mild and safer for children to use. Those that dislike child products were because they feel it is a marketing trick and a source of unnecessary consumption. However if this study had been done outside Europe e.g. USA, the result might have been different. For the Swedish market, however, these results made it clear that the target group for the developed products should not be the child but rather the family.

9.4 Conclusions

The questionnaire concluded that two different products were to be developed: a soap that shows the time needed for a proper hand wash and toilet paper with pictures on each square. It was decided not to proceed with the wet wipes idea. The idea to make wet wipes more available for the child is good but lot of time and effort would need to be placed on subjects outside the scope of the project.

The environment is very important among many parents and the product, in this case the soap dispenser, must therefore be as environmentally friendly as possible. The best idea would be to eliminate all solutions that demand electricity such as batteries because of the negative environmental impact that wrongful disposal of electronics and batteries can have. However, if this would not be possible at a reasonable cost one has to at least be able to separate the batteries easily from the dispenser since price is the most important factor in parents' choice of product (see Appendix I).

Based on the result from the questionnaire it was obvious to develop products suitable for the entire family and not only for the children since the products are to be used by the whole family. The products must still have a pedagogical purpose and appeal to children but they must also appeal to the rest of the family.

The following work will result in:

- Pump soap that will display the time for a proper hand wash
- Toilet paper with a picture on each square so that the child can count the squares
- Products that are pedagogical for a child but appeal to everyone in the family

10. Users and requirements

Once the products had been chosen, it was possible to more closely examine aspects required for creating concepts such as the demands and requirements and the users. This chapter examines these aspects.

10.1 Execution

To get a good start to the concept development phase the users (including the target consumers) had to be defined in order to determine factors that affect the interaction and design of the products. To determine how the products would fit into SCA and what they should express in order to suit the target consumers/users, branding was explored. After these steps a thorough requirement specification was drawn up for both the soap timer and the toilet paper using these findings and the results from the questionnaire (see chapter 9.3.1).

10.1.1 User profile

The intended users of the developed products were classified and analysed according to Janhager (2005). The user profile was based on information collected from studies. However, creating the user profile also helped define the intended use of the products. The user profile was done alongside a Persona. The persona aimed at describing the fictitious users' background, abilities and knowledge in relation to the found improvement areas.

10.1.2 Anthropometry analysis - JACK

To investigate how different users experience the soap and what kind of demands this sets on the product, a basic examination was done using JACK. Users ranging from the two-year-old child to eight-year-old child, and a 5 percentile woman to a 95 percentile man was examined in relation to an average sized wash basin (height and depth) and a soap container. This type of investigation would not be relevant for the toilet paper concept so this was only done for the soap concept.

10.1.3 Brand identity analysis and development

To explore how these types of products could fit into SCA's product line, the brand identity of SCA brands were analysed with the help of material received from SCA. Seeing that the products to be developed, especially the soap, were very different to any current SCA products it would be most suitable for them to be under a new brand. Hence, detailed analysis of a certain brands' visual identity would not be necessary. However, it was important that the new brand fits into SCA, so brand identity of current Swedish brands such as Edet and Libero was analysed to help the development of a possible new brand. Imageboards were used to help define the new brand's (hence products') expression as well as the core values.

10.1.4 Requirement Specification

A requirement specification was drawn up using the user demands acquired from questionnaires and user studies, together with criteria determined from the user profile and brand identity analysis.

10.2 Results

Results of the user profile, JACK, and brand analysis are shown here. All the needs found are collected into the requirement specification (Appendix K).

10.2.1 User profile

The questionnaire showed that the products should aim at family more than children since toilet paper and soap are products everyone in the family or household use. Hence the users are primarily the people in the family household that have bought the products.

Classification

Classifying the users according to the relation and interaction with the product or the users of the product is beneficial because each type of user may have different requirements (Janhager, 2005). Unfortunately, there has only been time to study the demands and requirements of the primary users; meaning those who use a product for its primary purpose. Other users' requirements, such as those who interact with the product but not for the primary purpose e.g. those who transport and pack the products, sales person and so forth have not been examined due to time constraints.

In this project, the primary users in this case are the family members who use the products. People visiting the household and use the products are also primary users. However, they are not the consumer and do not use them regularly therefore it is significantly more important that the product is suited for the persons of household that bought the product.

It is however important to note that users can have one or more role at any given time depending on the type of interaction (Janhager, 2005). So primary users can also at times be secondary users. For example, a person who uses the soap might also change the batteries or perhaps refill the bottle. This makes them a secondary user because they are interacting with the product but not for it's primary purpose. Due to this it can therefore be more convenient to talk about primary use, secondary use, side use and co-use, instead of the user types (Janhager, 2005). These different uses have been considered when compiling the requirement specification, for example, maintenance (secondary use), appealing design (side use) and so forth. (See chapter 8.2.1 for description of the types of user's/uses)

Use profile

A users' relation with a product is important to consider before designing a product because it affects the requirements and demands. Janhager

(2005) divides these relations under 4 categories. A use profile for the toilet paper and the soap with timer are discussed below.

Use background/experience
Toilet paper is used everyday at any time of the day. Parents are experienced users of toilet paper unlike the children who are learning how to use it. However, both are new to a toilet paper with pictures. Soap is also used everyday, and therefore needs to able to withstand frequent use. Parents are experienced with soap pumps, so it is more important to consider the capabilities of the child user when designing the soap.

Influence and responsibility of use
Parents have the major influence on the choice of product. Some parents let their children choose, however the studies showed that that was less common. This means the parents buy the product and this influences the design and marketing of the products. Parents have responsibility of the products, both that they should be available for use and functioning. This means that, for example, the cleaning and maintenance of the soap is the parents responsibility. Consequently, these functions do not need to be adapted to children.

Emotional relationship to the product
Toilet paper and soap are not products that many have any emotional relationship with. Both the toilet paper and the soap are considered to be the family's, and not one particular persons' possession, which may also be a reason for the lack of emotional connection. Social aspects such as wanting to signal group affiliation is also not very relevant since the products reside in the bathroom. However, the users might want to signal to visitors their views, taste, etc. For example, having a soap with a timer might signal their view that good hygiene is important. Since a toilet paper with print and a soap with a timer is unconventional and somewhat more expensive, the people who buy these may do so for other reasons apart from the functionality, e.g. how the products make them feel.

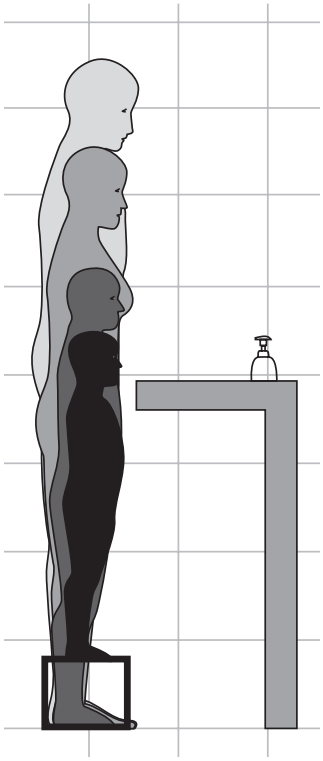

Figure 14. Anthropometry analysis with users: two-year-old, eight-year-old, 50 percentile woman and 95 percentile man

Persona
A fictional family was created to help get a better picture of our target users. The persona personifies the user profile, so as to be an aid during the concept development. (See Appendix J for the full persona with text and imageboard).

10.2.2 Anthropometry analysis

Figure 13 shows a diagram of the users and a wash basin. The view of the eyes of the different manikins were checked. From a two-year-olds perspective the soap is seen much from the front, whereas a 95-percentile man sees mostly the top of the pump. Since it is more important that the child sees the time showing device, this analysis showed that the display would be better placed on the front. However, tall people should also be

able to see the timer so this would be needed to be taken into consideration during concept development.

A brief testing of the arm reach was carried out which revealed that, as suspected, two-year-olds have harder to reach the top of the pump. This showed that the soap ought not to be higher than the common soaps on the market today, e.g. Palmolive. The observations at day-care centres confirm this. One day-care had a tall soap dispenser. It was harder for children to reach the pump and because it was so high it was also unstable. The day-care with a more standard-sized soap dispenser was easy for children to use.

10.2.3 Brand identity

The concept of a toilet paper and a soap to facilitate the teaching of hygiene routines, are products that do not fit well into any current Swedish brands in SCA today. Libero® is a diaper brand, but this is not suitable for these products since Libero is for babies and the concepts are aimed at families. Edet® is a tissue brand for products such as toilet paper and kitchen paper. This could work well with the toilet paper concept, however Edet would not be suitable for the soap. In addition, Edet does not stand for pedagogical products for families which also makes it unsuitable.

Though the concepts would not be very suitable for any current brand, in order to develop products that fit into SCA's product line and brand portfolio, it was decided to use Edet as an inspiration for a new brand. Edet is such a strong brand that a new brand could be created from it, a so called brand stretch. By stretching a brand, you keep the consumers who trust and use the brand but stretch it to include other products thereby increasing profit and sales. It requires more effort to create an entirely new brand rather than stretching a brand. (Taylor, 2004) Marketing and branding is however not in the scope of this thesis so the main reason for creating this new brand is to help decide the visual expression of the products and what values they should convey. Edet's target users and values used as a basis for the new brand.

Edet Family

The new brand is called Edet Family. It is aimed at families who want environmentally friendly and mild products with that extra smart solutions. The brand is cheerful and happy but still with a clean and simple design. The core values were chosen to be; playful, smart and friendly (figure 14). It is a family product and so it should have a playful expression that is appealing to adults and children. Edet Family stands for smart solutions. The products give you more than other products. This should be made clear by bringing the functionality to the forefront with the no-nonsense design.

Figure 15. Top: Mood-board for the brand Edet Family. Bottom: Imageboard of the brand's core values

10.2.4 Demands from questionnaires

Mostly women answered the questionnaire that was performed in the idea generation phase. Perhaps more women are members of parent forums which is why this was the case. The respondents had mostly 2 children of varying ages. General questions about bathroom showed that most share one bathroom but many also have two bathrooms. This shows that the products are most probably used by the whole family. Neutral and natural colours are preferred in bathrooms, and 50% think it is important that the bathroom and the objects match. This number was however, lower when asked the importance that the soap matches.

Almost everyone in the questionnaires use liquid soap, for reasons such as it feels more hygienic. The criteria for the purchase of a soap is based on (in descending order): Scent, price, environmental issues, design, what the child wants, brand, and lastly colour. (Appendix I) 80% say they buy soap based on what they want and not based on what their child wants, but the previous results show that the child does have some influence on the choice of soap. Some comments such as "everyone should like it" show that the entire families' tastes are sometimes taken into consideration. The demands on the soap dispenser are (in descending importance): Stability, good pump button, refill possibility, contains a lot of soap, appealing shape, appealing colour, and lastly the possibility to see the soap (transparency). (Appendix I) This shows that a stable soap dispenser is also important for the adults. Though the design does not seem to important, the questionnaire revealed that childish design is disliked even though they have children at home. See chapter 9.3.1 for further explanation.

The question regarding Intellitech (see Appendix F) confirmed that the time showing component should be activated when using the soap. Many thought that it would easy to forget to use the Intellitech when washing hands especially since it is an activity that should only last 20 seconds.

Toilet rolls are preferred to separate sheets, because that is what they have at home and they feel they can better adapt the amount of paper to use. Other reasons, were also that they feel they use less when using roll and also that it is quicker to take the right amount of paper. After urinating, most feel that 3 or 4 squares of paper is sufficient. After bowel movement, the amount people take varies from about 4-8 squares.

10.3 Requirements Specification

Taking the results from all previous studies, together with the definition of the users and the visual brand identity and expressions a complete requirement specification could be created. The requirement specification is divided into technical requirements, handling, maintenance, design (semantics), and environmental requirements. The requirements are graded on their importance on a scale of 1-5; 1 being "not of importance" and 5 being "necessary".

A summary of the major requirements for each concept are shown below. For the complete specification see Appendix K.

Toilet paper

- The product should possible to manufacture with today's methods
- The product should appeal to the entire family
- The product should be of a reasonable price (price range of Edet®)

Soap dispenser with timer showing component

- The dispenser should be recyclable
- The dispenser shall be as stable as possible
- The dispenser should be robust to handle falls and rough handling
- The dispenser shall be refillable and easy to refill

- Pushing the pump should activate the time showing component
- Time showing display should be on the side of the soap container
- Time showing component should allow easy battery change

- The product should appeal to the entire family
- The product should communicate SCA brand and values
- The product should be of a reasonable price

11. Concept development

From the idea generation it was decided to work with the idea of a toilet paper with a picture on each square and the idea of a pump soap that shows the time for a good hand wash. Now that the demands and requirements on these products had been defined, the design of the concepts could be developed. This chapter shows the process and results of this stage.

11.1 Execution

This chapter describes the execution of the idea generation and evaluation in the concept development phase. Different methods were used for the two areas; toilet paper with pictures and soap showing time.

11.1.1 Idea generation and evaluation

Toilet paper

To get inspiration for the toilet paper two different imageboards were made. The first imageboard was created with pictures of objects that appeal to children and objects that appeal to adults (see Appendix L). There were also some objects that appeal to both children and adults. This imageboard was made to help identify what children versus adults like in question of shapes, patterns and colours and thereby find a motif that will appeal to both children and adults. The second imageboard was made with different motifs that appeal to both children and adults as further inspiration to find the appropriate motif for the toilet paper (see Appendix M). The imageboards were inspiration during sketching of motifs. Adobe Illustrator was mostly used to idea generate motifs.

Questionnaire

See chapter 4.1.3 for theoretical framework of questionnaires. The evaluation of the ideas was again done with the help of a questionnaire made in the program Easy Research. The questionnaire was sent out to parents within SCA due to confidentiality. The four motif ideas were evaluated in the questionnaire. Each motif was presented in six different colours each colour given a number (blue shades [1], blue/turqouise [2], grey [3], blue/red [4], orange/green [5], green/blue [6]), and the motifs were also compared with each other in each colour. (See figure 15 for the four motifs in four different colours) The respondents were asked to score the different alternatives on the basis of what they thought were attractive and how clear and distinct they thought the motifs and colours would be for children.

Soap

An imageboard was put together with different kinds of soap dispensers that are available on the market today. The purpose was to get inspired and to become familiar with different solutions to pump soap. A study of pedagogical toys and products that show time was carried out to get ideas for the time function. In the meantime a lot of sketching was performed.

The ideas were then evaluated by using the Eco-design Strategy Wheel and the pros and cons method. The Eco-design Strategy Wheel was mainly used to decide whether the timer should be working mechanically or electronically and was then used through the whole idea generation to continually evaluate the ideas. The pros and cons method was used to evaluate each function of the soap separately and a morphological analysis was performed in order to combine the different functions into a complete and uniform design.

11.2 Result & evaluation

The resulting ideas of the concept development together with the evaluation of the ideas are described in this chapter. The toilet paper motif was evaluated with a questionnaire. For the soap concept, the idea generation and evaluation was much more iterative and therefore written together.

11.2.1 Toilet paper with pictures

The idea generation resulted in a lot of different suggestions of motifs for the toilet paper. During the idea generation, a motif where two pictures alternate on every other square was chosen to be the best way to help children take appropriate amount of toilet paper. For further explanation see chapter 9.2.1 or chapter 12.1.1.

Result

There were numerous iterations of idea generation and evaluation during the development of toilet paper motifs. Four motifs were chosen based on their distinctiveness and how appealing they might be to people of all ages. All four motifs are abstract to a varying degree as this was felt to most effective way to appeal to all ages. These four motifs were then evaluated with a questionnaire.

Evaluation

The respondents were asked to score the different alternatives on attractiveness and distinctiveness (see Appendix N for questionnaire results). The result from the questionnaire shows that motif B was considered to be most distinctive, followed closely by motif D. The reason for this could be that these motifs were the least abstract motifs. One can associate them with perhaps a flower while motif A and C do not picture anything concrete. Motif B was possibly more distinctive because of the larger area it covers making it stand out more.

These motifs were also considered to be most attractive among parents. When it comes to the colour it was number 4 (blue/red) that was considered to be most distinctive while colour 1 (blue shades) and 2 (blue/turqouise) were the most attractive ones. This result was not surprising since number 4 with the red and the green colour is a bit darker than the others and therefore stands out more. Number 5 with the bright orange and light

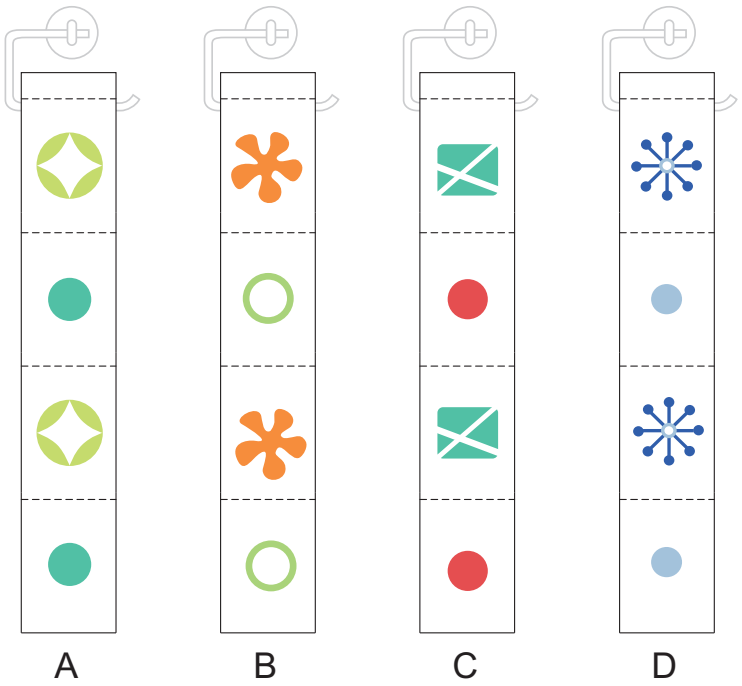

Figure 16. The four patterns and four of the six colours that were evaluated in the questionnaire.

green was not far behind when it came to distinctiveness. Number 1 and 2 with the blue colours were considered most attractive probably because blue is a very common colour for bathrooms and also shown in tests to be an attractive colour to many people (Kopacz, 2003).

11.2.2 Soap showing time

The development of a soap concept started with an examination of the best design strategy using the Eco-design Strategy Wheel. Time can be shown either with a mechanical solution or using electronics. The possibilities with having a mechanical solution was explored before it was decided that an electronic solution would be continued with. After this step, ideas were generated on ways to show time and the functional morphological design of the soap.

Results of Eco-design Strategy Wheel

The result from the evaluation with the Eco-design Strategy Wheel showed that a mechanical solution should be the most sustainable choice for the timer. The most relevant steps in the method are mentioned below.

To reduce the impact during usage, a mechanical solution is to prefer since it does not contain any batteries that impact the environment during usage. The materials of the mechanical design can be chosen with respect to the environment while electronics contain metals that are harmful to the environment. When it comes to optimising the length of life a mechani-

cal solution does not have batteries that need to be changed after a while like an electronic solution do. A mechanical solution also optimises the disposal better than an electronic solution since there are no batteries or electronics that can be accidentally thrown together with the rest of the garbage without recycling.

Mechanical timer

A search for other products with mechanical solutions was made on the internet and a lot of sketching was performed to generate ideas. Four ideas were then chosen to evaluate and develop further (see figure 16 and figure 17). These ideas were evaluated through a discussion together with a mechanical expert at Chalmers and two watchmakers. A soap company was also consulted to evaluate the ideas and to get an understanding of soap containers and soap pumps, i.e. what to think about when designing soap dispensers and how much it might cost.

Idea number 1 was rejected at an early stage due to it not being considered interesting and fun enough since the time indicator would move straight up and very slowly due to the short distance it can move.

According to the soap company it is very important that everything in the soap container is tight. Due to this argument any idea containing any sort of liquid was not possible to manufacture to a reasonable price since it

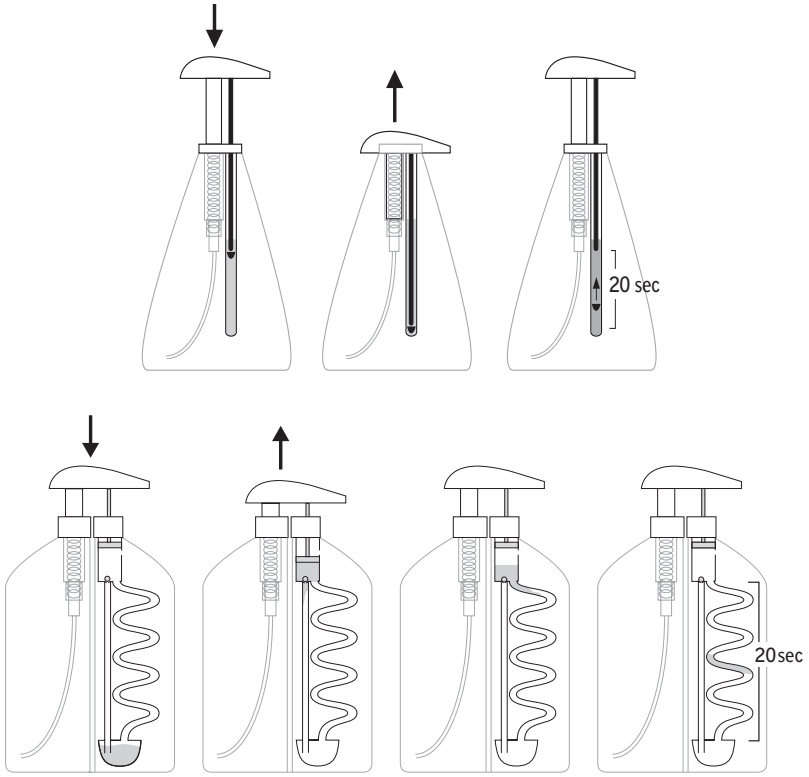

Figure 17. Top: Idea number 1 Bottom: Idea number 2

would need a lot of expensive seals in order to make it work. This means that idea number 2 was no longer interesting either.

The 2 remaining ideas with an hour glass (number 3) or an indicator (number 4) could work if the mechanics is put on the outside of the dispenser. However, these two ideas still needed a lot of extra work in order to work properly. In addition, after further evaluation it was concluded that mechanical solutions would also be too expensive. Mechanical solutions require good tolerances if they are to be of good quality and withstand frequent use. The small parts of mechanical solutions would also make it more breakable. For these reasons it was decided to not proceed with any mechanical solution for the timer.

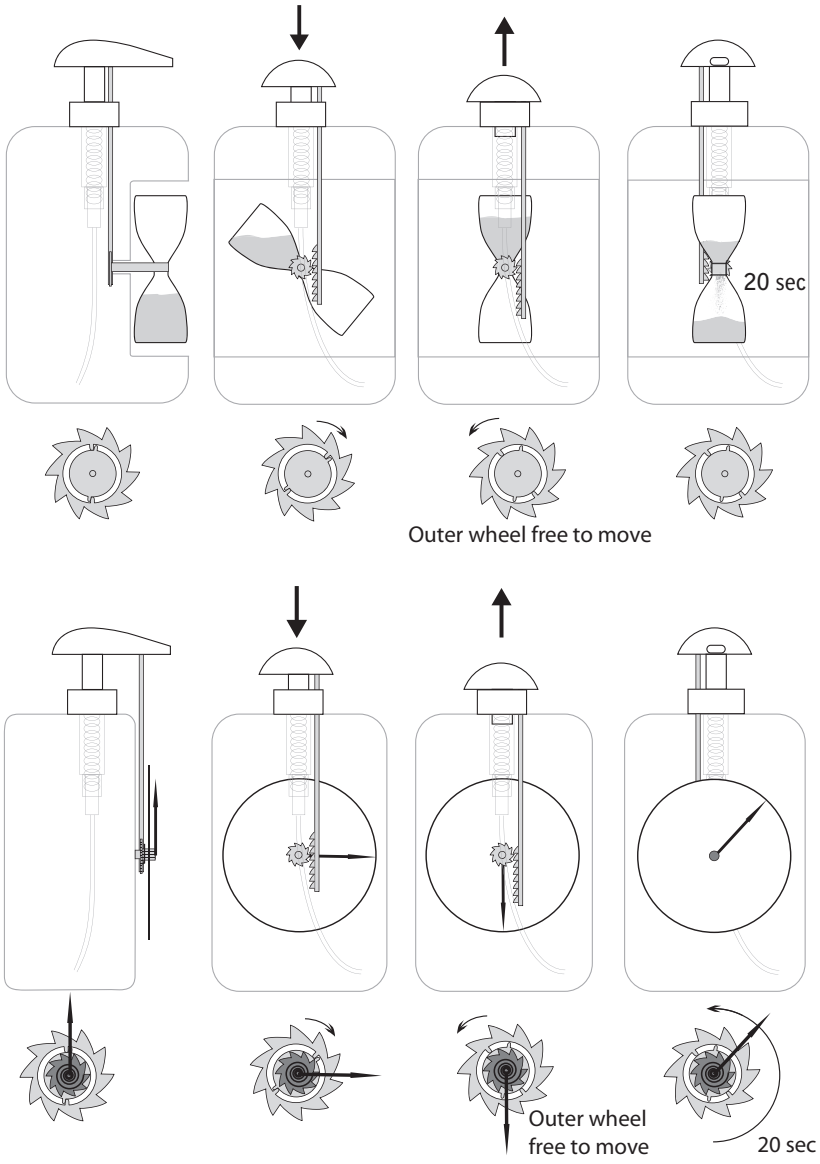

Figure 18. Top: Idea number 3 Bottom: Idea number 4

Electronic timer

For the continuing work in the concept development phase it was decided to show the time electronically instead since this is cheaper and gives larger opportunities. However, an important demand was then that the electronics were sealed and could easily be removed from the soap dispenser to enable recycling. Due to this demand the electronic part had to be placed separately somewhere on the outside of the dispenser. Another important demand was that the timer should be activated by pressing the pump head to get soap. It was decided earlier to show the time somewhere on the front of the bottle for the best visibility but exactly where at the front depended on where the electronics should be placed and how the timer would be activated from the pump head. A morphological analysis was performed to help analyse the different suggestions on where to put the electronics and the button. The ideas are shown in figure 18, 19, 20.

The first idea was to have the button integrated in the pump head (figure 18) but this required a specially made pump which would be expensive. In addition, having electronics on a moving part such as the pump might make it less robust and easily breakable. A decision was made to use a standard pump instead since it would be less expensive.

The second solution was to have a small timer at the bottom of the bottle that is activated through an "arm" that goes up to the pump head and activates the timer when the pump head is pressed down (see figure 19). However, this solution might not be robust due to the protruding arm that could easily break. In addition, the arm could result in a scattered design and expression.

The last picture shows an idea of a timer that is attached at the bottom of the bottle and activates through a large button at the bottom of the timer (see figure 20). This solution has a small consumption of material, is detachable from the soap bottle and gives a uniform expression. (See Appendix O for pros and cons evaluation of the ideas)

Ways to show time

More ideas were generated about how the time function should be displayed. One solution could be to have an LCD display showing the time. However, after further discussion this was considered expensive, not environmentally friendly enough, and unnecessary for the small amount of information that the timer shall present.

One of the ideas for a mechanical design was to show the time in the same way as a clock. As written in chapter 7.1.2, information should if possible resemble the reality. It therefore seemed appropriate to use this strong icon for time. An indicator could show the 20 seconds on the timer like the hands show the time on the clock. This could at the same time help children to learn about the clock which most children do within the age of 4-8. However, since the soap timer will only show a few seconds and

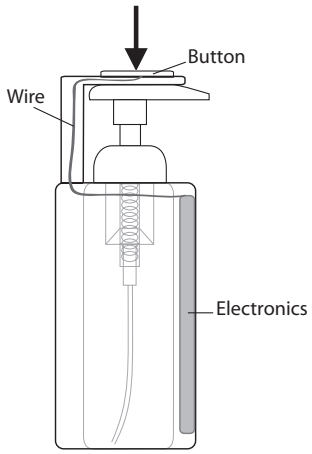

Figure 19. A: Button integrated on pump head

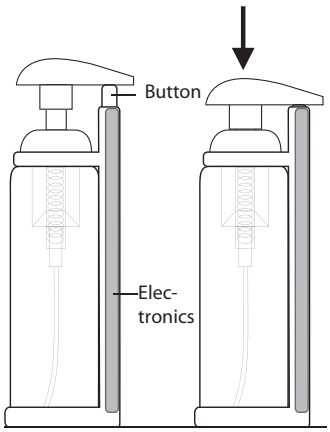

Figure 20. B: Protruding button up to pump head

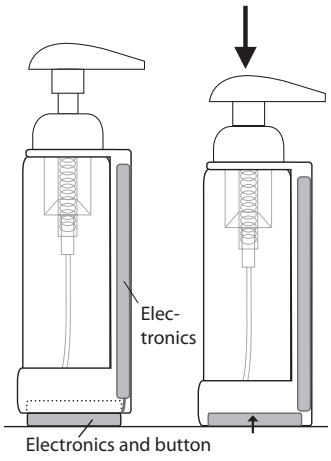

Figure 21. C: Button placed at the bottom

will not show the minutes and hours it could probably confuse the child more than it would help. This idea was therefore not longer interesting to develop further.

An electronic solution also made it possible to use lights such as LED lights to show the time which is interesting and fun for children. Different ideas about how to place the LED lights were explored. Having the lights placed in a row showing time using light sequence from left to right or from the bottom to the top was considered inappropriate. This representation would not be associated with time as it is more associated with the increase some kind of variable, e.g. changing volume. It therefore seemed more appropriate to place the lights in a circle and show the time in a light sequence clockwise to remind of a clock since this is the mental model of time as mentioned earlier (chapter 7.1.2). The difference between this solution and the solution with an indicator is that it helps the user to associate the light sequence with time without mistaking it for a clock since there is no indicator. Placing the LED lights in a circle also goes very well together with the motif on the toilet paper. (See chapter 12.2.3)

11.3 Conclusions

The conclusions from this section are more detailed concepts of the toilet paper and soap dispenser. The exact finished design of the concepts is first presented in the next chapter.

11.3.1 Toilet paper

Due to the result from the questionnaire motif D and motif B was chosen to be further developed, since they both were considered to be both distinctive and attractive. It was found after more research that motif B is quite a common type of shape. And motif D looks quite strict and hence not very playful. The goal was to make a unique form that at same time is playful and attractive, hence further development on motif D and B was needed. So by trying to combine the fun playfulness of the irregular shape of motif B, together with the more strict circular shape of motif D a desirable form could be reached. The final motif after this further development is described in chapter 12.

11.3.2 Soap

With the help of the Eco-design Strategy Wheel and the pros and cons method a final concept could be chosen to develop further. The concept development phase resulted in a design with a separate timer that is attached at the bottom of the bottle and activates through a button at the bottom. The time is shown by LED lights that turn on in a clockwise sequence. These lights were to be integrated in the motif that would be used on the toilet paper to give a coherent design. The final design of the soap is shown in the next chapter.

12. Final concepts

After some further iterative development and evaluation, this chapter will describe the final concepts, shown below in figure 22 and figure 23.

Figure 22. The toilet paper concept.

Figure 23. The soap with timer concept.

12.1 Toilet paper concept

The functionality of the toilet paper, meaning how it facilitates the teaching of appropriate amount of toilet paper is described in this chapter. The design is also described below.

12.1.1 Functionality

The concept aims at helping children learn how much toilet paper is appropriate after having used the bathroom. The reasons for children taking too much/too little toilet paper can vary from physical difficulties to cognitive difficulties. This concept aims to improve the cognitive difficulties, such as not having an understanding how much is appropriate.

The idea behind the concept is to make it easier for the children to perceive how many squares of paper they take. Firstly, from the user studies it was revealed that when discussing amount of toilet paper, many talked in the number of squares. This means that the users' mental model (see chapter 7.1.2) of toilet paper is that it is built up of squares. It is beneficial to use mental models to make a product easy to understand and use. Consequently, the toilet paper concept is built on the idea of helping the child take the right number of squares.

This is achieved by having a picture on each square allowing the child to count the number of squares. (Four- to six-year-olds can normally count a few numbers so the concept is adapted to capabilities of the users.) Today, children have to remember how much the parents have shown them to take or they have to use their problem-solving skills to determine how much paper is appropriate. Without a clear rule or guideline the child might have difficulty remembering what parents have told them is a good amount. Using their problem-solving skills is also difficult because they do not have enough knowledge or experience with toilet paper to determine appropriate paper amount (knowledge-based decision, see chapter 7.1.3). Through shaping and observational learning (when their parents help them wipe or tell them how much to take) they will eventually learn what is a good amount. However, this learning process could be speeded up by giving them a rule to follow as rules are the fastest way to learn new behaviour (See chapter 3.2). This toilet paper concept facilitates this. By making it easy to see each square, each square can easily be counted. The parents can then tell their child how many squares to take and the child can easily execute the command/rule.

The motif is more advanced than a picture on each square. To make it even easier to perceive and count the number of squares, there are two pictures that alternate on every other square (see figure 24). This is because humans naturally try and group and see a pattern (see chapter 7.1.1), hence by having alternating pictures a pattern emerges using similarity Gestalt law. This pattern allows one to faster count the number of squares because the pictures can be grouped into pairs. One picture on each square results

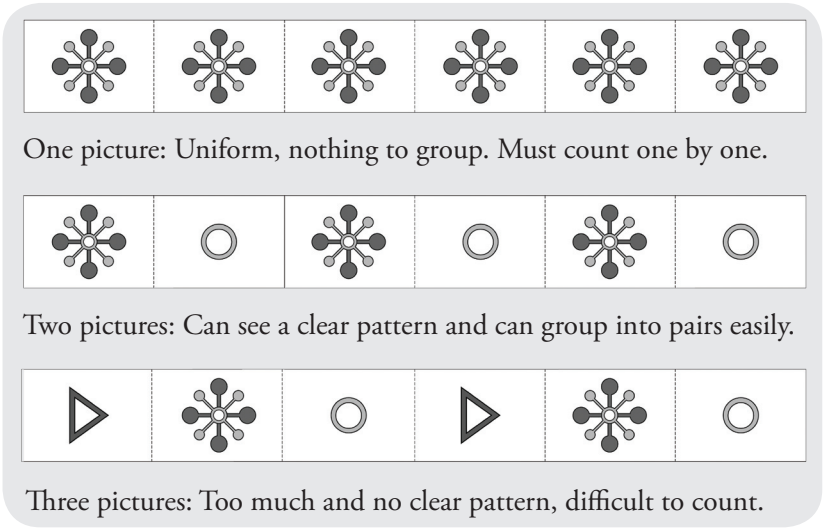

Figure 24. Illustration showing the result of different number motifs.

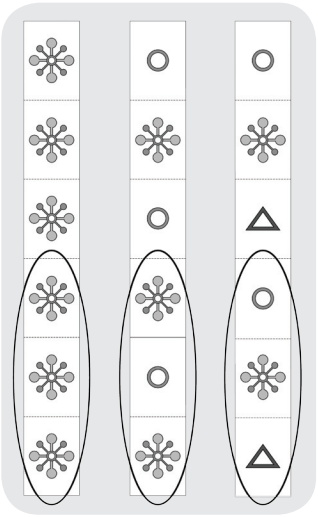

Figure 25. Example of taking three squares

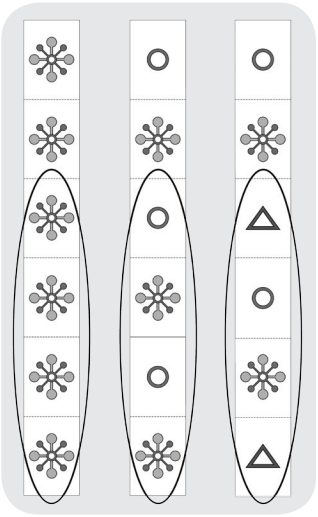

Figure 26. Example of taking four squares

in a uniform line of pictures so each square has to be counted one by one. Three pictures alternating is too much, and no clear pattern emerges making it harder to easily perceive the number of squares. In addition, six-year-olds tend to group pictures in pairs and associate things with each other making this a very suitable concept (see chapter 3.1).

The user studies showed that many think four or three squares is appropriate after urinating. This concept can then facilitate the counting of squares because then only two pictures need to be counted. For instance, the parents can tell their children to take two of one picture, e.g. "Take two rings". See figure 25. Children at the age of four can normally count but if only a few numbers can be counted, alternating pictures requires them to count only one picture making it easier. If the parents want the child to take three squares, there is in fact no need to count because they can instruct the child to take till they see one more of the picture, e.g. "take till you see one more flower". See figure 26. This could be suitable for children that have not learned how to count yet.

An additional advantage with the concept is that since the children would be counting squares, this concept gives them a chance to practice. This concept can also be good for adults, as it helps to increase the awareness of how much paper is used. User's may realise that less paper can be used, thereby saving paper and money.

Flexibility

This system is flexible and gives the user's the choice of how many squares to take. This is important because everyone uses different amount of toilet paper, as well as the fact that an adult will want to adapt the amount of toilet paper to each situation. The parents should also have the choice of how much toilet paper they want their child to take. This is unlike the product Cottonelle® For Kids which decides for the user that five squares

is the amount to take. (See figure 27.) In addition, everyone who uses the paper must follow the system in order for it to work.

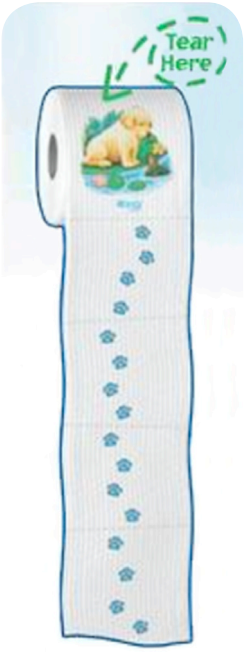

Figure 27. On the market today: Cottonelle® For Kids

12.1.2 Design

Motif

The motifs are abstract so as to not aim at any age or gender. It also helps to appeal to more people because each person can make it out to resemble what they like. For example, one might see the icon as a flower, a molecule, a snowflake etc.

The "flower" icon is combined with a more simple ring, so that the pattern is not overwhelming and to make the icon stand out more. Both the icon and the ring are round and use circular shapes to give a friendly expression in accordance with the core values. The spread out arms of the icon also adds to a playful and friendly embracing expression, together with the different sized circles which also adds more dynamism.

The icon's shapes spread out from the centre resulting in a collected form so that users will see it as one picture. Since one picture is placed on each square to help see the number of squares, the icon needs to be perceived as one. Hence the a rounded form which is perceived as the most compact (see chapter 7.3.2). The icon is also a very structured and symmetrical shape. This helps in the perceiving of the motif since six-year-olds see symmetrical objects long before asymmetrical (see chapter 3.1) In addition, the structured shape helps children between the age 2-3 to see the motif as a whole (see chapter 3.1) Though they are outside the main target group it is good that the concept fits their needs as well. The black contour also helps to make it stand out more to be more distinctive. The outstretched arms of the icon also allows for the shape to cover a large area of the square without having too much ink on one area.

Figure 28. The toilet paper in three different colours

Colour

The toilet paper comes in three colours; orange/green, green/turquoise, and blue/light blue. (See figure 28) The orange, turquoise and green are quite strong colours but are not too loud in order to appeal to both children and adults. The colours aim at giving the paper a fun and friendly expression hence the vivid but not loud colours.

Having different colours to choose from gives parents (and the children) the freedom to pick the one they like the best, or perhaps the one that matches their bathroom. The blue colour concept are for those who prefer more conservative colours. In some colour preference tests it is shown that blue is a well-liked colour so this concept adheres to those preferences (Kopacz, 2003). In addition, blue is associated with water, making it quite a fitting colour for the bathroom.

12.2 Foam soap with a timer

The following section presents the functionality and the usage of the product, the design details and the semantics and finally how this product fulfils the demands for a sustainable design.

12.2.1 Functionality

The soap and timer concept consists of a bottle of foam soap and a separate timer that can easily be attached to the soap bottle. The timer activates through a large button at the bottom of the timer. When the pump head is pressed down the button is pushed in and the timer starts. When the timer starts LED lights turn on one by one in a clockwise sequence. The interval between each light is 2.5 seconds which gives in total 20 seconds until all the lights are lit. On the 20th second the green light in the centre turns on to indicate that the hand washing is completed. The lights turn on continually and shows the progress so that the user will know how much time is left. After another two seconds all the lights turn off in the same time. (See figure 29.)

The timer

The aim with the timer is to give the child a clear goal when washing their hands. Because many children wash their hands too quickly the timer will indicate when it is finished. Since children may not fully understand why it is important to wash your hands (do not understand the consequences) and also due to their restless nature, they need more incentive to wash their hands for longer. In the studies, the child-minder mentioned that she liked to use timers to get the children to perform an activity e.g. cleaning up, because it is an effective method and the children think it is fun. In addition a timer could work well especially with six-year-olds because they like time-keeping according to literature (see chapter 3.1 figure 2).

Figure 29. From the left: The pump is pushed and the timer is activated. The lights turn on clockwise with a 2.5 second interval. The sequence ends with a green light in the middle on the 20th second..

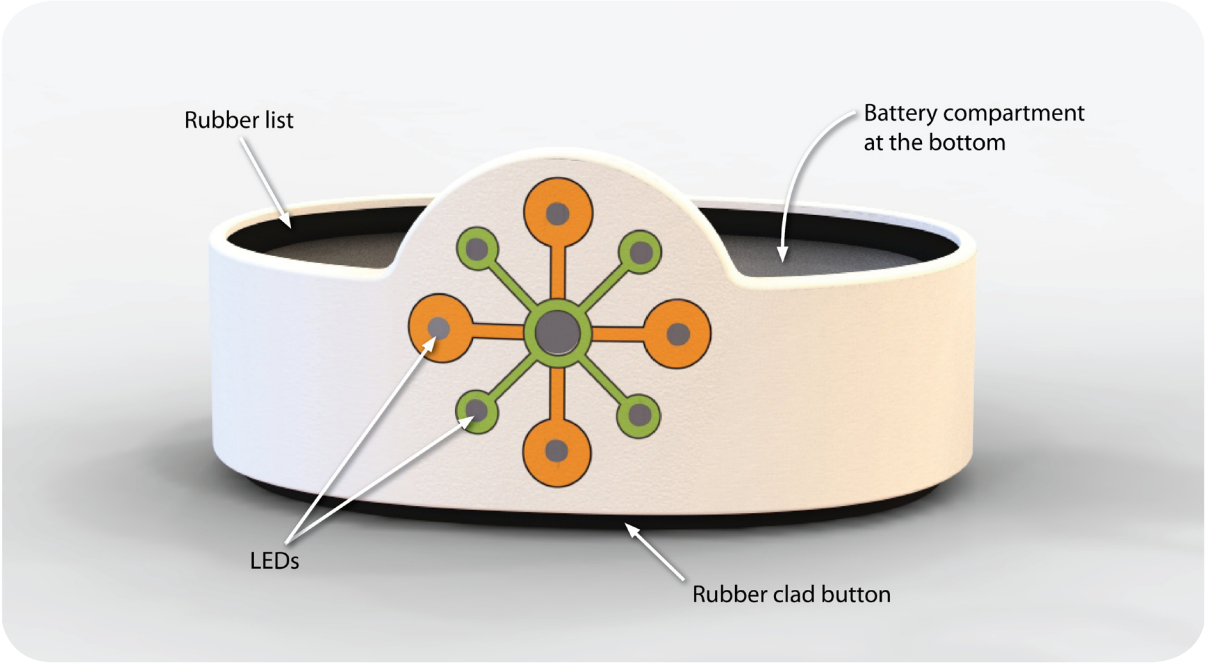

Figure 30. The different features of the timer.

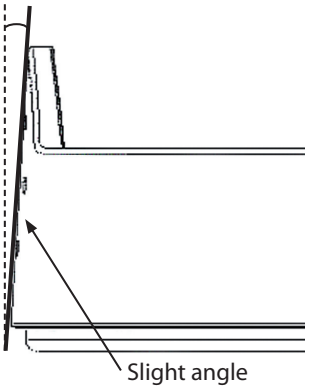

Figure 31. The front of the timer is slightly angled for improved visibility.

One major criteria in the project was that parents teach their children the importance of hygiene and that the products were only a tool to facilitate the teaching of good hygiene routines. The timer is this tool that parents can use. The timer provides a way to give children a rule to follow, e.g. "wash your hands till the whole flower is lit". As mentioned earlier and in chapter 3.2, rules give fast and effective behaviour change. The hope is that with the frequent use of the soap and timer, children will move from a rule-based action to skill-based action; after frequent use they learn the skill of washing their hands. Even adults may learn this skill after using the timer for some time.

Due to the fact that parents are responsible for the teaching no explanatory symbols have been used to explain the time function. Having symbols was considered unnecessary since the parents will explain to the child how the soap and timer work and after the first usage the child will know how it works. With this concept the parent can simply say: "wash your hands till the whole flower is lit". This is easier for the child to understand and it is also easier for the parent than explaining the meaning of symbols.

The light sequence was chosen to be the right tempo. The timer must keep the child interested in washing their hands, but not distract it from washing; hence, the 2.5 second interval. Having the LEDs light up and stay on shows the progress so that one knows how much time is left for hand washing. The green light at the end of the sequence makes it clear when the goal has been reached which might give the child a sense of achievement, a type of positive reinforcer for the behaviour (see chapter 3.2).

Figure 32. Foam soap spreads easily on the hands.

12.2.2 Usage

The timer attaches to the soap using the friction from the rubber list (see figure 30) on the inside of the timer. The tight fit between the rubber list and the bottle also hinders water from slipping in and collecting at the bottom of the timer, which eases maintenance and cleaning. The batteries are placed inside the timer at the bottom in a watertight compartment to eliminate the risk of water slipping in. The lid is screwed off when changing the batteries becomes necessary. The large button at the bottom of the timer is rubber-clad for a better grip at the water basin so it will stand still when using it. The front of the timer, where the LED lights are placed, is slightly angled for improved visibility for taller people since everyone in the family must be able to use the soap (see figure 31).

The soap is a foaming hand wash which is fun and interesting for children as well as easier to rub on the hands than it is with ordinary liquid soap. Foam soap spreads more easily when the hands are put together (see figure 32) unlike ordinary liquid soap where one has to rub the hands together until foam is produced. This improves lathering of soap which was also shown from the user studies not be carried out properly by children.

Figure 33. The soap dispenser and timer from a front-, side- and back view.

Figure 34. The soap is designed in three different colours and scents: Blue Sea, Green Apple, Scent-free.

Figure 35. The label works well with the timer: the icon is placed in the centre on both.

The fun aspect of the foam may also help keep them motivated to wash their hands longer in combination with the timer.

The pump together with the timer is 17 cm which is 1 cm higher than the standard Palmolive dispenser. (See Appendix P for drawings.) This is to help ensure that children can reach the pump head during usage. In addition, this helps ensure that it is stable and will not tip over too easily if the child wrongly pushes on the pump. The wider timer and rubber clad bottom also helps keep it stable during use. The soap dispenser is narrower on one side, even though this can make it slightly more unstable. This is to help make sure the soap will fit on the wash basin as normally there is limited area on the basin.

12.2.3 Design

Figure 33 shows the soap from a front-, side-, and back view. The soap bottle is designed with round shapes for a friendly expression and a wide base to enhance the look of stability. The bottle is narrower when viewed from the side so that it is not experienced as bulky.

Colours and scents

The soap and the timer are designed in three different colours. The soap comes in three different scents: blue see, green apple and a scent-free option for extra sensitive skin. The scent free soap has more discrete colours to express extra sensitive. The other two has quite strong colours for a playful and fun expression (see figure 24).

The label

The pictures below show the label from the front and the back (figure 36). The strong icon is placed a bit irregularly for a lively and playful expression. The label is also designed to work well with the timer since one of the icons is placed on the same spot as the icon on the timer so that when the timer is attached to the bottle the icon on the label is hidden and replaced by the one on the timer. In this way the label looks good even if the timer hides parts of it (figure 35).

Figure 36. The label on the front and the back.

The logo is clearly visible on the front of the label and also on the back. The words "Foaming Hand Wash" is chosen to clearly express what is inside the bottle and the text "Natural and mild" express that it is a mild product. On the scent-free option this text is replaced by the text "Extra Sensitive" since it is even milder for extra sensitive skin. These texts are written in the font Arial Rounded Bold MT which is easy to read and the roundness in the letters make the text look a bit childish and playful but still clean.
The environment is important for most users, especially when it comes to hygiene products since an environmentally friendly product often is associated with mild products. This product should therefore have some kind of eco-label, for instance the Nordic eco-label "svanen" which is placed in the right lower corner of the soap label.

On the back label a text about the product is written in the Nordic languages. The text explains the purpose of the product and that it is a part of a range of products developed to facilitate the performing of hygiene routines in child families.

Semantics

As mentioned in the previous chapter, the mental picture of a clock is round and the time moves clockwise. This is the reason for the placement of the LED lights on the timer. The LED lights are placed in a circle and turns on in a clockwise sequence so that the user will associate it with time. But since no hands are used as in a traditional clock it will not get mistaken for a clock that shows the day's hours and minutes.

The chosen colour for the LED lights are white except for the light in the centre which is green. White coloured light is more neutral and is therefore suitable for showing a time sequence. A green light is often associated with OK or clear (see chapter 7.1.1) and is therefore chosen for the light in the centre that will inform the user that the hand washing is complete. The LED lights are placed in the strong icon on the timer to give the soap a coherent design.

The pump is a standard design of a soap pump and is chosen for its good semantics and easy pumping action. Choosing a typical pump is to make it easily identifiable and so that children will associate it with soap and hand washing. In addition, the surface of the pump head is large and exhorts the user to press it (see chapter 7.3.3). The large surface is also good for children since a child's hand is not fully developed motorically and can therefore have difficulties with controlling the movements of the hand.

12.2.4 Sustainable design

The fact that the timer is detachable from the soap bottle makes it a sustainable design (see figure 37). The users can choose for themselves whether they want to use the timer or not and they can keep the same timer even if they buy a new bottle of soap. There is also a smaller risk that

the timer with the electronic parts and batteries will be thrown together with the rest of the garbage without recycling. The ability to change batteries also makes sure that the life-span of the timer is long.

As mentioned in the user demands, price is a very important criteria when buying soap. It is unsustainable to produce a product that no one will buy, hence it was important the timer would not be expensive. An electronic timer can easily be manufactured so the cost of the timer would be held low, hence people would likely buy it. And at the core of sustainable design, products that there is a need for and that are useful and beneficial should be pursued. This concept fulfils both those criteria.

The compactness of the timer results in minimised transportation volume. And the fact that it is attachable makes it possible to transport it together with the soap dispenser saving even more transport space. The thickness of the timer is thinner at the back because all of the electronics is collected at the bottom, apart from the LED lights at the front. This minimises the amount of material.

Figure 37. The timer is detachable from the soap dispenser for a sustainable design.

12.3 The two concepts

The toilet paper and soap have a coherent design fulfilling the requirement set earlier in the project. They match well together showing that they are part of the same product range. The design of the toilet paper and soap dispenser with timer can be applied to many other types of products. The concepts are design to match as many people's preferences and bathrooms as possible, for an example of the toilet paper and soap in a bathroom environment see figure 38.

Figure 38. The two concepts in a bathroom environment

13. Discussion

A discussion of the project's process, methods, and result is the subject of this chapter. The difficulties and what lessons have been learnt are discussed together with a discussion of the project's outcome.

13.1 The process

The project was very open-ended and required the development of new products and not the improvement of a current product. This was quite new to us which therefore required another design process than what we are familiar with. Therefore, some time went into exploring how to precede which in return resulted in unnecessary long time and effort being placed on some activities. In addition, this made it difficult to plan the time for the project which is also a contributing factor for the extra time that was put on the project.

Since the project was very open-ended it started very broad and it has successively been narrowed down. The process has been very structured with different parts where new limitations have been set after each part. This has helped us to stay focused during the process and it has been especially helpful in the idea generation.

13.2 User studies

The subject children resulted in numerous difficulties in the course of this project. The method of collecting data and performing studies had to be adapted in order to make it possible. When adults are the users to study, one can contact them directly. But with children the parents must be contacted first before any kind of study could be performed. In addition, very specific age span of children was needed.

Our solution to this was to use online parent forums to come into contact with parents to children of the age 4-6. This was a very effective and time saving way to get hold of the correct users. Other ways of coming into contact with parents, such as waiting for them to pick up their children at preschool to talk with them in person would be too time consuming. Preschools were also not open to the idea of giving out e-mail addresses to parents making that approach not a possibility. In addition, asking the preschool personnel to get parents to sign a form that allowed us to perform studies of their children would also be too time consuming and was therefore not an option. Hence contacting parents through forums was the most effective way to go. It was also an effective way to come into contact with many parents quickly.

13.2.1 Questionnaire

Because of the digital media used to come into contact with parents,

"in person" methods could not be used. This is the reason for the many questionnaires in the project. The advantages of the questionnaires was that we received many answers quickly, both saving time and resulting in statistically sound data due to the high number of respondents. However, questionnaires do not allow for follow up questions and the structured answers can also lead to the nuances getting lost. Many qualitative questions were included in the questionnaires (and also in the modified journal observations) in order to work a bit like a structured interview. Nonetheless, many of the questionnaires aim were to get statistical data and it was therefore a suitable tool to use.

Another issue we discovered with the questionnaires was that it was difficult to avoid formulating unambiguous questions: even though we thought the question was very clear and unambiguous it could result in an answer that was not clear enough. We would therefore have liked to perform pilot studies, i.e. test the questionnaires on one or more test persons before sending it out to the users, in order to eliminate misinterpretations from the respondents. However, we did this with the first questionnaire which was sent out on the internet but it was too time consuming since we had to wait for the answers. Perhaps we should have printed out the questionnaire instead to ask people in the nearby to fill it in directly in place.

13.2.2 Observations

Observations is one of the best ways to observe users as the implicit needs can be revealed, unlike methods such as interview and questionnaire which only result in the explicit needs. Therefore, observations needed to be performed. However, this would be difficult to do. Apart from the difficulties already mentioned, observing a child in the bathroom is a private matter and it would be difficult to get parents to agree to us observing their child. In addition, there was also the problem of finding time to do these observations because during the day when parents work and their children are at preschool meaning there is also a limited time span observations can be performed.

This led to an adapted method called the modified journal method, which meant parents did the observations for us. This was a good solution to the problem but the reliability and the quality of these observations are arguable. There were varying degrees of detail, even though we instructed them to be as descriptive as possible (even if it felt silly). We did ask follow up questions if there was anything we did not understand. However, it is difficult to say if there are things we could have seen because we see it from a designer's point of view that the parents did not observe. We also asked them to make a judgment on what they thought was most difficult for their child to perform because from a description it is difficult to know how much the child struggled. This subjective opinion may also not be very reliable. The best would have been to observe ourselves but we feel

that the journal method was a good method for this project. Plus if we had observed, the child might not have felt comfortable and would not behave naturally which also would have affected the results. So in some way it was better for the parents to observe and it was a very suitable tool for this project since it was fast and gained a lot of knowledge from it.

13.2.3 Focus group

The focus group was very fun and rewarding for us since we were not that used to conducting a focus group. It was therefore sometimes difficult to get everyone's voice heard despite our effort and the well-prepared guide. A reason for this was also that two child-minders participated in the focus group and they had tendencies to take over and tell everyone else how it works since they had this as a profession and saw themselves as experts on the subject of children. We thought that it would be beneficial since they had a lot of experience of children, but this was not the case.

13.2.4 Results of the user studies

Because of the users to study were children questions of how they think during the observations, and interviews for example was not possible to do directly with the children. Hence the parents had to act as interpreters. Hence it is difficult to say how well the cognitive reasons for the problems were studied. However, for the scope of this project the execution of the user studies was done in the best possible way and the depth of the studies was sufficient.

13.3 Idea generation

The idea generation was only done by us. It could have been beneficial to use idea generation methods in larger groups to get more ideas from more people. However, it is important that the people participating in idea generation methods understand the problems and have the background knowledge necessary. So due to this fact, and that the setting up brain-storming sessions would take time it was decided that it would be most effective to keep it within the project group.

13.4 Evaluation

We have only used the pros and cons method and the Eco-design Strategy Wheel when evaluating ideas. The pros and cons method is very basic and may not give any fine details. But we consider it to be enough since the evaluations never were that complicated. A more advanced method would probably have been useful if we had a lot of different concepts with similar properties where the different concepts had both many good properties and many bad properties.

13.5 The resulting concepts

Due to the time constraints the concepts could not be tested but we recommend doing this as a next step in the product development process of these products. Without verifying the toilet paper concept with any user tests, it is difficult to say how well it works. The same goes for the soap concept. The lamp sequence has not been tested to see if it is the best interval to use. We have chosen to have an interval of 2,5 seconds but perhaps it should be a smaller or larger interval, however we think that a smaller interval perhaps would be more disturbing than helpful and with a larger interval you might loose the child's attention. Nonetheless, the arguments for the design decisions are based on theory in the relevant subjects so they should be quite reliable.

When it comes to the design of both the toilet paper and the soap dispenser one can argue if the flower-like icon is the best motif to use. Perhaps it is a bit feminine since most people associate it with a flower which is a traditional "girly" motif. Also the fact that round shapes are used, to make it look playful and suit children, perhaps contribute to a feminine-like design. Nevertheless, it is impossible to create a design that pleases everybody.

The concepts fulfil the demands specified in the demand specification. Some of the demands are however difficult to say whether they are met at this stage. Testing with users would be needed to verify this. This applies to the requirement that the design appeals to as many people as possible. In addition, how well concepts work and whether they work with the mental capacity of a four-year-old also needs to be verified. All in all, we are pleased with this master's thesis and our resulting concepts.

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Appendix

Appendix A

Pre-study questionnaire

Vi är två studenter från Chalmers tekniska högskola i Göteborg som gör vårt examensarbete. Det går ut på att utveckla en produkt som ska underlätta barns lärande av hygien. Vi behöver nu din hjälp att få en bättre förståelse för barn och deras hygien. Frågornas syfte är att ge en överblick och är därför generella. Om du har fler än ett barn så kan du ta ett genomsnitt eller ta ett av barnen som exempel när du svarar på frågorna. Du svarar anonymt och informationen kommer endast användas i detta examensarbete.

Tack på förhand!
Frida och Sofia

Ditt/dina barns ålder.
Om du har barn i olika åldrar kryssar du i flera rutor.

- [ ] Yngre
- [ ] 2 år
- [ ] 3 år
- [ ] 4 år
- [ ] 5 år
- [ ] 6 år
- [ ] 7 år
- [ ] 8 år
- [ ] 9 år
- [ ] 10 år
- [ ] Äldre

Barnet/barnens kön

När slutade ditt/dina barn använda blöja dagtid (började använda pottan)?
Alternativen nedan innebär från födelsedagen och ett år framåt. Ex. om barnet var 3 år och 8 mån fyller du i "3 år".

- ◯ 0 år
- ◯ 1 år
- ◯ 2 år
- ◯ 3 år
- ◯ 4 år
- ◯ 5 år
- ◯ Minns ej
- ◯ Other:

När slutade ditt/dina barn använda blöja nattetid?
Alternativen nedan innebär från födelsedagen och ett år framåt. Ex. om barnet var 3 år och 8 mån fyller du i "3 år".

- ◯ 0 år
- ◯ 1 år
- ◯ 2 år
- ◯ 3 år
- ◯ 4 år
- ◯ 5 år
- ◯ 6 år
- ◯ Minns ej
- ◯ Other:

När slutade ditt/dina barn kissa i sängen?
Alternativen nedan innebär från födelsedagen och ett år framåt. Ex. om barnet var 3 år och 8 mån fyller du i "3 år".

- ◯ Kissade aldrig i sängen
- ◯ 1 år
- ◯ 2 år
- ◯ 3 år
- ◯ 4 år
- ◯ 5 år
- ◯ 6 år
- ◯ 7 år
- ◯ 8 år
- ◯ 9 år
- ◯ 10 år
- ◯ Äldre
- ◯ Minns ej

När började du potträna ditt/dina barn?
Alternativen nedan innebär från födelsedagen och ett år framåt. Ex. om barnet var 3 år och 8 mån fyller du i "3 år".

- ◯ 0 år
- ◯ 1 år
- ◯ 2 år
- ◯ 3 år
- ◯ 4 år

- ◯ 5 år
- ◯ Minns ej
- ◯ Other:

När började du lära ditt/dina barn att gå på toaletten själv?
Alternativen nedan innebär från födelsedagen och ett år framåt. Ex. om barnet var 3 år och 8 mån fyller du i "3 år".

- ◯ 1 år
- ◯ 2 år
- ◯ 3 år
- ◯ 4 år
- ◯ 5 år
- ◯ 6 år
- ◯ Minns ej
- ◯ Other:

När började ditt/dina barn gå självmant på toaletten men fortfarande behövde hjälp med torkning?
Alternativen nedan innebär från födelsedagen och ett år framåt. Ex. om barnet var 3 år och 8 mån fyller du i "3 år".

- ◯ 2 år
- ◯ 3 år
- ◯ 4 år
- ◯ 5 år
- ◯ 6 år
- ◯ 7 år
- ◯ 8 år
- ◯ Minns ej
- ◯ Other:

Bad barnet om hjälp att torka sig eller bedömde du att det behövde hjälp?

- ◯ Barnet bad själv om hjälp, ex. "färdig!"
- ◯ Jag bedömde att de behövde hjälp.
- ◯ Minns ej
- ◯ Other:

fyller du i "3 år".

- ◯ 3 år
- ◯ 4 år
- ◯ 5 år
- ◯ 6 år
- ◯ 7 år
- ◯ 8 år
- ◯ Minns ej
- ◯ Other:

När började ditt/dina barn tvätta händerna utan hjälp?
Alternativen nedan innebär från födelsedagen och ett år framåt. Ex. om barnet var 3 år och 8 mån fyller du i "3 år".

- ◯ 2 år
- ◯ 3 år
- ◯ 4 år
- ◯ 5 år
- ◯ 6 år
- ◯ 7 år
- ◯ 8 år
- ◯ Minns ej
- ◯ Other:

När började ditt/dina barn duscha eller bada utan hjälp?
Alternativen nedan innebär från födelsedagen och ett år framåt. Ex. om barnet var 3 år och 8 mån fyller du i "3 år".

- ◯ 3 år
- ◯ 4 år
- ◯ 5 år
- ◯ 6 år
- ◯ 7 år
- ◯ 8 år
- ◯ Minns ej
- ◯ Other:

Vad tog längst tid för ditt/dina barn att lära sig när det gäller hygien?
Du kan välja fler än ett alternativ.

- [ ] Använda pottan
- [ ] Använda kranen
- [ ] Tvätta händerna
- [ ] Använda tvål
- [ ] Tvätta händerna tillräckligt länge
- [ ] Torka händerna
- [ ] Tvätta ansiktet
- [ ] Gå på toaletten i tid
- [ ] Ta lagom mängd toalettpapper för torkning
- [ ] Torka sig när de har kissat
- [ ] Torka sig när de har bajsat
- [ ] Spola
- [ ] Minns ej
- [ ] Other:

Vad upplevde du vara det främsta hindret när ditt/dina barn skulle lära sig?
Du kan välja fler än ett alternativ.

- [ ] Produktens utformning
- [ ] Barnets fysiska förutsättningar (tex. längd)
- [ ] Barnets motorisk förmåga (tex. förmåga at greppa med handen)
- [ ] Barnet förstod inte hur uppgiften skulle utföras
- [ ] Barnet förstod inte syftet med uppgiften
- [ ] Barnet ville inte lära sig
- [ ] Barnet hade ingen ro att lära sig (rastlös)
- [ ] Minns ej
- [ ] Other:

Vad var svårt för ditt/dina barn att fysiskt utföra i badrummet?
Du kan välja fler än ett alternativ.

- [ ] Använda kranen
- [ ] Använda tvål
- [ ] Sätta sig på toalettsitsen
- [ ] Sitta på toalettsitsen
- [ ] Torka sig när de har kissat
- [ ] Torka sig när de har bajsat
- [ ] Spola
- [ ] Minns ej
- [ ] Other:

Vad upplevde du vara orsaken till svårigheten?
Du kan välja fler än ett alternativ.

- [ ] Fysiska förutsättningar (tex. längd)
- [ ] Motorisk förmåga (tex. greppa med handen)
- [ ] Produktens utformning
- [ ] Minns ej
- [ ] Other:

Hur lärde du ditt/dina barn att ta hand om sin hygien?
Du kan välja fler än ett alternativ.

- [ ] Genom att få barnet att imitera en vuxen
- [ ] Genom att upprepa uppgiften ofta
- [ ] Genom lek
- [ ] Genom ex. en sång eller ramsa
- [ ] Genom att använda en leksak som förebild, ex. en nalle som tvättar sig
- [ ] Genom att få barnet att lära ut till sin nalle/docka
- [ ] Gjorde inget särskilt
- [ ] Minns ej
- [ ] Other:

Hur bra tycker du din utlärningsmetod fungerade?
Svara endast om du hade en specifik metod

	1	2	3	4	5	
Mycket dåligt	○	○	○	○	○	Mycket bra

Övriga kommentarer angående ditt/dina barns hygien.

Appendix B

Instructions for Modified Journal Method

Hej!

Tack för att du vill delta i vår undersökning. Du kommer att få observera ditt/dina barn som är i åldrarna 2-7 år när de utför sina hygienrutiner i badrummet och svara på frågor inom detta ämne. Har du fler än ett barn i dessa åldrar behöver du endast observera ett av dem, men vi är mycket tacksamma om du väljer att observera flera. Notera då ålder och kön när du fyller i informationen för varje enskilt barn. Om du väljer att endast observera ett av dina barn bör barnet vara så nära 4-6 år som möjligt.

All information kommer endast användas för detta examensarbete och kommer att behandlas anonymt, dvs. inga namn eller personuppgifter kommer att nämnas. Som tack för din medverkan kommer du att få två stycken biobiljetter som skickas till din postadress.

Observationerna bör påbörjas så snart som möjligt och pågå under cirka 2 dagar så att inte bara en specifik situation och beteende observeras. Försök att inte ingripa när ditt barn utför uppgifterna dvs. påminn inte om vad som ska göras eller hur det ska göras. Vi vill se hur barnet utför uppgifterna på egen hand så ingrip endast efter att barnet anser sig vara klar.

Läs gärna igenom formuläret innan du påbörjar observationerna.

Under observationerna bör du svara på frågorna 1-6 så detaljerat du kan, även om det verkar onödigt detaljrikt. Skriv gärna direkt i formuläret. Sista delen är frågor som kan besvaras på egen hand. Frågorna är relaterade till examensarbetets syfte vilket är att utveckla en produkt som ska hjälpa att lära barn hygienrutiner. Skicka sedan det ifyllda formuläret till kidshygiene@gmail.com.

Tack så mycket och lycka till!
Med vänliga hälsningar
Frida och Sofia

OBSERVATIONSFORMULÄR

Ålder:
Kön:

1. Sätta sig på toastolen

Hur sätter sig barnet på toastolen?

2. Torka sig när de har kissat

Står eller sitter barnet när de ska torka sig?

Hur drar barnet av pappret från rullen?

Ungefär hur mycket toapapper tar barnet?

Hur hanterar barnet pappret? (rullar ihop det till en boll, viker pappret etc.)

Hur torkar de sig med pappret när de har kissat?

Vad tror du var svårast för ditt barn att utföra?

Övriga kommentarer

3. Torka sig när de har bajsat

Står eller sitter barnet när de ska torka sig?

Hur drar barnet av pappret från rullen?

Ungefär hur mycket toapapper tar barnet?

Hur hanterar barnet pappret? (rullar ihop det till en boll, viker pappret etc.)

Hur torkar de sig med pappret när de har bajsat?

Vad tror du var svårast för ditt barn att utföra?

Övriga kommentarer

4. Spola

Hur spolar de toaletten?

Är det några svårigheter för barnet att spola toaletten?

5. Tvätta händerna

Hur går det till när barnet sätter på/stänger av kranen?

Hur tar barnet tvål?

Hur gnider de in tvålen?

Hur sköljer de av tvålen?

Hur torkar de händerna?

Vad tror du var svårast för barnet att utföra?

Övriga kommentarer

6. Övriga observationer

7. Frågor

Utlärning av hygienrutiner

- När började ni med potträning?
- Hur gick potträningen till?
- Vad hade ni för svårigheter under potträningen?

- När började barnet använda toalettstolen?
  - Hur lärde du barnet det?
- Hur lärde du barnet att torka sig själv?
- Hur lärde du barnet att tvätta händerna?
- Vad hade ni för svårigheter under toaletträningen?

- Hur lär/lärde du barnet hygienrutiner dvs. inte bara hur man fysiskt utför dem utan även när man ska utföra dem? (Tex. Att man ska tvätta händerna efter toalettbesök osv.)
- Vilka rutiner är/var svårt att få barnet att lära sig när det gäller hygien och varför?

- Har du någon särskild metod eller hjälpmedel för utlärning av hygien? Hur bra fungerar det?

- Är du och barnets andra förälder eniga när det gäller sätt att lära ut hygienrutiner?
  - Om inte, hur skiljer sig era åsikter åt i frågan?
  - Vem av er lär ut hygienrutinerna? Är det jämt fördelat mellan er eller inte? Varför?

Produkter för barn

- Vad tycker du om produkter som är avsedda för barn? Varför tycker du så?
- Vad tycker du om produkter som har ett lärande syfte? Varför tycker du så?
- Använder/använde du några speciella barnprodukter?
  - Vilka?
  - Hur tycker du att dessa har fungerat?
  - Varför var dessa produkter bra/dåliga?
  - Vad skulle du vilja få ut av en sådan produkt?

- Finns det någon produkt för barn och deras hygien som du tycker saknas på marknaden?
- Vad är viktiga krav för att du ska välja en viss produkt? (miljöpåverkan etc) Varför?
- Föredrar du engångsprodukter eller permanenta produkter som kanske måste monteras? Varför föredrar du det?

Appendix C Result from modified journal method

Age & gender	Sit on toiletseat	Wipe after urinating							
		Stands/sits	Pull off paper	Amount of paper	Handling of paper	Wiping	Difficulties	Other	
Boy 2,75	Is lifted by parents or with the help a stools	Sits - often parent wipes	Pulls paper till it tears off by itself	Depends on the amount of paper on roll - because he pulls till its tears off by itself	Scrunches up paper in hand	taps	Pulling off paper from toilet roll		
Boy 3,25	With the help of a stool.	Stands	-	Too much. Takes less when parent instructs	Scrunches up paper in hand	taps	Taking the right amount of paper		
Boy 3,5	Backs up against seat and holds on to the back of the lid.	Sits	One hand while holding on to the seat so as to not fall off	10-20 dm	Holds paper at one end like a long snake	-	Pulling off paper while holding on		
Boy 4	Pulls himself up on seat while leaning against the toilet	Both	Holds roll with one hand while pulling with the other.	2-3 dm	Takes paper in the middle and therefore folds	Pushes paper against gentials	Pulling off the paper	Sometimes does not wipe after urinating	
Girl 4,5	Backs up against seat and sits on it like a chair	Sits	Tears it off	10-15 dm	Scrunches into a ball	From back to front	Taking the right amount of paper		
Boy 4,5	Puts hands on seat and pulls himself upp. Sits legs wide apart and far back on seat. Sits during urination and bowel movement.	Stands next to toilet	Holds roll with one hand while pulling with the other.	3-5 dm	Holds paper at one end like a long snake	Taps carefully with one end of paper	Reach toilet paper while sitting on seat	Puts the dirty end of paper in toilet and the other end hangs outside. Sometimes closes lid. Looks funny when the paper is flushed.	
Girl 6	Sits like on a chair then lifts legs one by one reptitively to move back onto seat	Stands	Hard and fast	3-5 dm	Scrunches into a ball	Hand behind the back	Drying enough		
Boy 6	Sits like on a chair	Sits	Pulls with both hands	4-5 dm	Scrunches into a ball				
Girl 7	Easily sits on seat	Both	Pulls paper so that there are small bits on floor	Good amount	Scrunches into a ball	Hand between legs from the front	Pulling off paper so that it is intact and a good amount		

Wipe after defecating							Flushing	
Stands/sits	Pull off paper	Amount of paper	Handling of paper	Wiping	Difficulties	Other	Flushing	Difficulties
SIts	Parents wipe						Pulls lever once or several times	Flushes too many times
Squats	Grabs paper and pulls	Too much	Scrunches into a ball	Taps a little - parents dry for him	Reach paper		Pushes button	Reach the flush button - climbs on the toilet
Stands	Boths hands	5 dm	Holds paper at one end like a long snake	Hand behind the back. Puts hands on floor and bends over for inspection if area is clean (habit from daycare)	Wiping is most difficult		Walks to the side of toilet and pushes button	None
Does not dry himself							Pushes button	Can be difficult to push the button all the way down
Sits	Tears it off	Less amount of paper than after urinating	Scrunches into a ball	Front to back			Pulls the lever straight up	To remember to flush
Shouts "done" to call for parents to come and wipe him. Says he wants to wipe himself but when it comes down to it he doesn't and parents or caretaker must wipe.							Stands next to toilet and pulls lever.	None
Stand	Hard and fast	4 dm	Scrunches into a ball	Hand behind the back	Knowing when wiping is finished		Pulls the lever straight up	None
Sits	Pulls with both hands	Used to take alot of paper but after having talked with him he takes the same amount as for urinating	Folds paper	Hands behind back	Determining amount of paper and wipe the area clean		Pushes button	None
Sits	Pulls paper so that there are small bits on floor	More than after urination	Scrunches into a ball	Hand behind the back	Determining amount of paper and wipe the area clean		Pushes button	None

Wash hands						
Turning on/off tap	Take soap	Lather soap	Rinse off soap	Dry hands	Difficulties	Other
Does not reach tap handle - parents do it for him	Pumps a dobble of soap or parents do it for him	Palms together and rubs back and forth	Fast and eagerly - soap left	Fast and eagerly - does not get dry	Rinse off soap and dry hands - too eager to play again	
Pulls up handle on tap	Pushes 2-3 times on the pump	Palms together and rubs back and forth	Holds hands under runnning water till soap lather is gone	Palms on the hand towel		Parents sometimes help in the washing up
Pulls up handle on tap	Pushes with one hand and holds the other in front to take soap	Rubs palms together, then turns one hand to rub palm against the back of the hand and vice verse	Holds hands under runnning water till soap lather is gone	Hand towel - rubs hands a little - not really dry	Take soap	Keeps tap on luke warm water so that he does not burn himself
Lifts handle	Uses bar of soap or soap pump with more difficulty	Varies - sometimes very careful to rub between fingers and on the back of the hands and sometimes not at all	Varies form fast to carefully. Let's the water run through the hands till soap is gone	Just grabs the hand towel	take soap from pump	
Lifts handle	Soap pump	With great care	Carelessly	Drys fast but after reminders does it more carefully	Drying hands enough	
Entire hand aroun tap knob and turns on cold water only.	Does not take soap if not reminded. Bar of soap - Squeezes/hugs the soap. Pumps soap	Rub hands quite thoroughly togther. Used to make "soap windows" when he was younger.	Passively rinses off soap under water - no rubbing	Just grabs the hand towel	To remember that washing hands requires more than just a quick rinse under water	
Lifts tap handle straight up with the right hand	Pushes with the left hand and takes soap wih the right	Like when rubbing hands with lotion	Alternating (left, then tigh etc.)	Fast	Drying hands dry	
Pulls up tap handle	Pushes soap with the left hand and takes soap wih the right	-	Places hands under tap			
Pushes up tap handle then pulls it left to warm water	Uses soap pump	Rotating movements - takes great care in having clean hands	Rubs hands under the running water	Towel or paper towel	Rinsing soap off	

Appendix D

Focus group guide

Introduktion

17:50-18:00 Möta vid entrén. Står ett tag till och tar emot sena.
18:00-18:10 Be dem ta mat och kaffe/te. Be dem sitta vid sitt namn. Skriv på sekretessavtal.
18:10-18:13 Hälsar dem välkomna och presenterar oss själva. Berätta syftet.
18:13-18:18 Be dem presentera sig själva och ålder på deras barn.
18:18-18:20 Presentera upplägget på fokusgruppen.

Allmänt

18:20-18:25 Vad innebär hygien för er? (Vad associerar ni till? Vilka bilder får ni?) Vad är personli
hygien för er? Barn och hygien – vad tänker ni då?
18:25-18:30 Dela med er av era egna erfarenheter när det gäller era barn och hygien. Koncentrer
på toalettbesök och handhygien, dvs. inte munhygien eller duschning.

Problem

18:30-18:35 **Dela gruppen i två och två.**
Diskutera era barns situation i badrummet.
Vad funkar och vad funkar inte? Skriv gärna ner punkter i en lista.
18:35-18:40 Redovisa det ni har kommit fram till. *Gör en lista i PowerPoint.*
18:40-18:50 Diskutera punkterna. Kom fram till mer punkter. *Fortsätt på listan i PowerPoint.*

Barnprodukter

18:50-19:10 Nu har vi kartlagt lite problem.
Har ni gjort någonting/köpt någonting för att minska problemen?
Det finns ju en del hjälpmedel som ska underlätta och minska problemen. Vad tycker
om sådana? Har ni använt några sådana produkter? Ni som inte har använt det – var
Har ni medvetet valt att inte använda er av hjälpmedel?

Hjälpmedel

19:10-19:25 Bilder på hjälpmedel.
Bild nr 1. Fysiska hjälpmedel – Toaring, spol-pedal och pall.
Bild nr 2. Pedagogiska hjälpmedel – Tidsuppfattning (Soap tunes, Squid soap, Intellite
Bild nr 3. Pedagogiska hjälpmedel – Toarullen Cottonelle och Kandoo våtservetter
Bild nr 4. Lockande/roliga hjälpmedel – Toilet Buddies, figur-tvål, fisken, tinkle target

Inlärning av hygien

19:25-19:27 **Dela gruppen i två och två.**
Diskutera hur man kan lära barnen om hygien
19:27-19:35 **Gemensam diskussion med följdfrågor**
Hur kan man lära barnen om varför man ska ta hand om sin hygien?
Hur lär man bäst barnen *hur* man tar hand om sin hygien?
Hur får vi barn att sköta hygienen själv – utan att föräldrar är närvarande?
Gör en lista i PowerPoint.

Produkt idéer

19:35-20:00 Hur kan man integrera dessa idéer i en produkt? Idéer till hur en produkt skulle kunn
underlätta barns inlärning av hygien rutiner och vanor. *Gör en lista i PowerPoint.*

Avslutning

20:00-20:03 Sammanfatta och tacka för deltagande. Ge biobiljetter i kuvert. Städa undan.

Appendix E

Observations at pre-schools and childminder

Observation 1 09-02-17, 10:30 – 12:30
Number of children: 15 – 20
Age: 3 – 5 years

Two toilet rooms were located in a separate washing room. Each toilet room had one toilet with a flush handle that you pull up and one washbasin, both in a smaller size to fit the children better. Two small washbasins were also placed outside the toilet rooms. The basins inside the toilet rooms were however not in use, there was no soap or hand towel/paper; the children had to wash their hands in the basins outside the toilet rooms. One bottle of liquid soap was placed on one of the basins. A Torky dispenser with folded paper was placed on the wall behind the basins. Every child had their own plastic mug with their name on it to drink water in when they are thirsty.

Before and after lunch the children had to wash their hands with soap and water. After lunch they usually went outside to play and they always used the toilet before they went outside. The children were told to use soap when washing their hands before lunch but only five out of fifteen (?) did this. Only one child used the soap in a proper way; most of the children using the soap did not rub their hands with the soap, they only put some soap in the middle of the palm and then just rinsed it off without rubbing it in. Most children washed their hands under water for a maximum of five seconds.

After lunch and before they went outside, an adult were standing outside the toilets in case someone needed help and also to make sure that they were washing their hands with soap and water. If no adult were watching, most children tried to avoid washing their hands after using the toilet. Some children who washed their hands directly after lunch and then went to the toilet found it difficult to understand that they had to wash their hands ones again after using the toilet. Unfortunately, all children used the toilet with a closed door so it was not possible for us to observe them using the toilet.

Summary of problems we could see:
Not enough soap for every one
It was difficult for them to push the soap out
They did not use soap if no one told them to do it and also was watching them
They did not rub their hands with the soap
They only washed their hands for a maximum of five seconds
They did not understand the purpose of washing their hands

Observation 2 09-02-20, 11:00 – 12:30
Number of children: 7 out of 20
Age: 3 – 5 years

Two toilet rooms were located in a separate washing room just like the previous day care centre we went to. Each toilet room had one toilet with a flush button that you push. The toilets were made in a smaller size to fit the children better but the washbasins inside the toilet rooms were in normal size. Two small washbasins were placed outside the toilet rooms. One bottle of liquid soap was placed on each basin. A Torky dispenser centerfeed roll was placed on the wall. Most of the children took a very large piece of paper to dry their hands. There was often a teacher standing by the dispenser to help the children take the right amount of paper.

We arrived to this day care centre half an hour before lunch. Only seven children out of twenty were there. The rest of the children were home sick. Most children were sitting down painting dragons. We joined them for a moment to try to ask them questions about their toilet visits like how they wash their hands and such but it was difficult for

them to answer these questions.

Before lunch, the children washed their hands. All of them used soap and rubbed their hands in the soap but they tend to use too much soap. It seemed like they thought it was very fun to push many times on the soap to fill the hand with the green liquid and to make a lot of lather. Many of the children washed their hands for quite a long time, more than ten seconds. Some of them did this because it was fun to play with all the lather from the soap. There was one girl who almost forgot the soap but one of the teachers reminded her.

They had lunch at 11:30 and after the lunch they all went to the washbasins to wash their hands and mouth. Everyone used soap and most of them also washed their mouth. Also in this day care centre we could not observe the children using the toilets since they all closed the door.

Summary of problems we could see:
They take too much soap -Fun pushing the soap many times
- They take too much paper
- They might forget to use soap if no one reminds them

- Fun playing with lather

Observation 3 09-02-25, 11:00 – 11:45
Age: 5 - 7 years

The toilet rooms were placed in the entrance. They were not placed in a separate washing room and there were no wash basins outside the toilet rooms. It was therefore very difficult to observe the children using the toilets and basins. We could only see two little girls in the age of five who washed their hands for 10 to 15 seconds with soap. They had to stand on the toes to reach up to the basin which was in natural size. They both took two pieces of paper to dry their hands.

Most of the children closed the door when using the toilet or washing their hands so this observation did not give us enough information. We left the preschool without any successful result.

Observation 4 09-03-02, 10:45 – 12:00
Dagbarnvårdare (Child minder)
Number of children: 5
Age: 2 – 5 years

This observation was performed in a home setting. It turned out to be more like an interview with the child minder rather than an observation of the children. Questions about children, children's hygiene and more general questions about hygiene products and learning toys were asked.

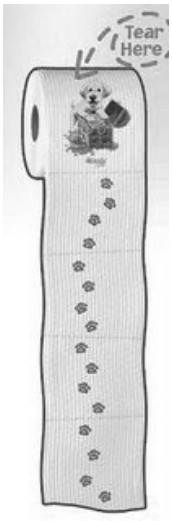
When we arrived the children were outside playing. When we all got inside the house all children had to wash their hands. All of them used soap. The child minder helped the smaller children to wash their hands by holding them over the washbasin. Before lunch, all children had to wash their hands again. All of them used soap and washed their hands for about ten seconds.

The bathroom was located just across the entrance door. All children had their own towel with their own colour to make it easier to keep them apart. The child minder said that it was recommended that all child minders had paper towels instead of ordinary towels but she did not like that; she thought it felt too much like an institution with paper towels. It was a bit difficult for the children to reach up to the basin but there was a stool to use in case they needed it. A bottle of liquid soap was standing on the basin.

Appendix F

Result from focus group and descriptions of products.

Product	Name	Description	Positive comments	Negative comments
 	Potty-pal	Toilet seat ring adapted to the size of children. Easily lifted when not in use.	"Very good"	"A little fiddly and complicated" "Kids get used to it and can't use another toilet"
	Stool	Stool to help children reach sink and/or toilet seat.	"Essential" "Everyone has one" "Good to rest feet and get up"	
	Footflush	An attachment to the toilet while allows it to be flushed by stepping on the pedal.	"Hygienic and good" "Every toilet should have one"	
	Potty Bench	Training potty with side storage, dispoal of waste and lid. With lide down can be used as a stool for kids to stand on.		"unnecessary" Did not really understand how it works "Can it be a risk that kids get too used to it?"
	Intellitec Wash & Briush Timer	Shows how long one should wash hands or brush teeth. E.g. The button with a hand is pressed and a green light starts flashing, and once the recommended time has passed the red light turns on.		"It would work well with brushing teeth – but unnecessary when washing the hands because it is too short time period"

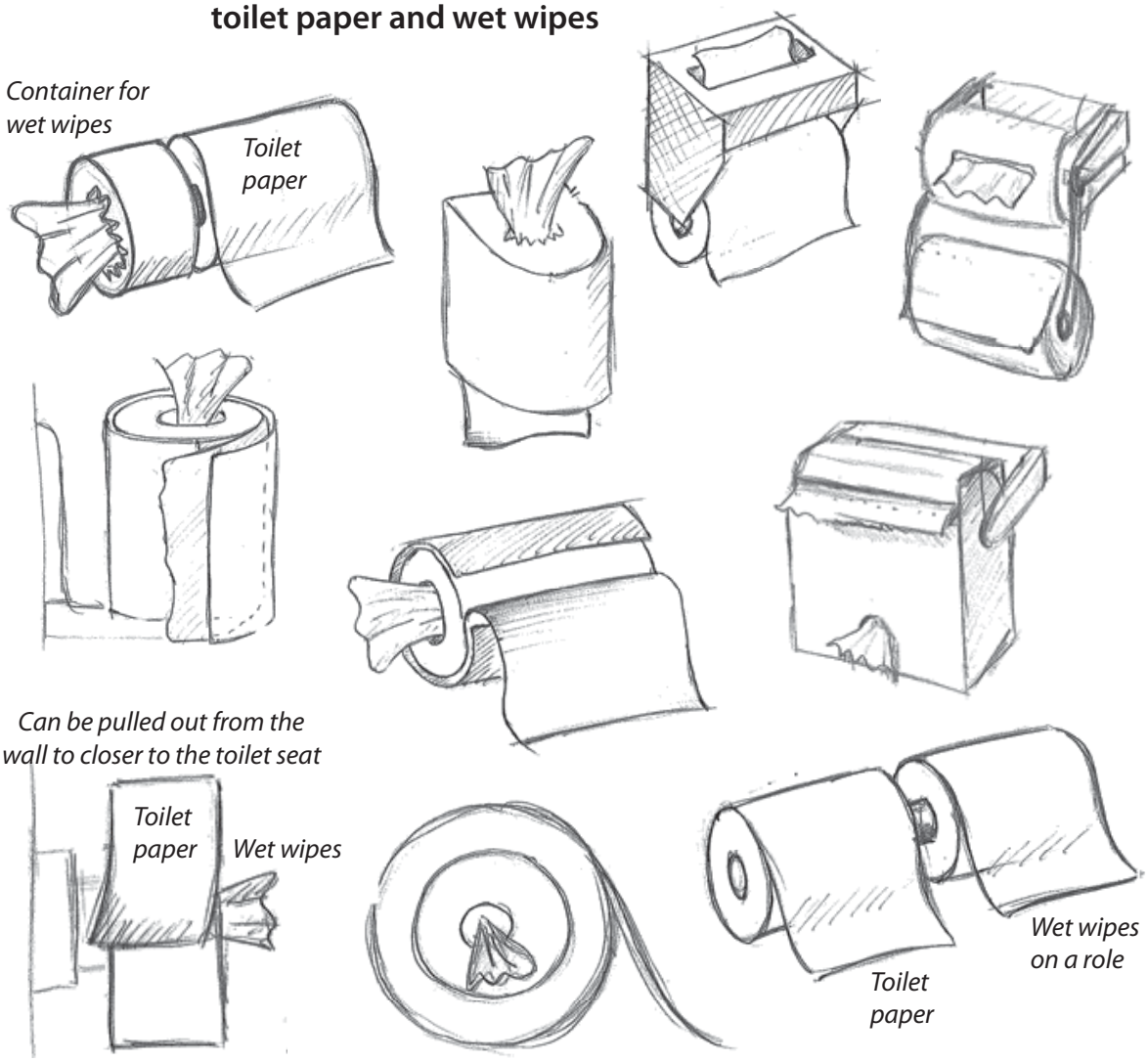
	Squid Soap by Airborne	When the child pushes the pump to take soap, a little mark of ink is stamped on the hand. The ink is designed to wash off after the hands are washed for about 15-20 seconds. This is to help encourage kids to wash their hands thoroughly.	"That must be fun"	"They are just going to rub the mark away"
	Soap tunes	When the child pumps to take soap, music with lyrics begins to play. The child is to wash their hands till the end of the song.	American"	"Too much" "That one seems like fun"
	Cotto-nelle® for Kids	Toilet paper with print indictaing where to tear off. To help ensure kids do not take too much or too little paper.	"Very cute"	"Is it every other pee and poo length. *Laughing* "Completely unnecessary- you're wiping your butt. It's something you have to do." "They are not going to wipe themselves better."
	Pampers Kandoo Flushable toilet wipes	Wet wipes that are flushable (but is disencourgade in Sweden and hence is no longer sold to consumers). A tub holder can be bought separately to hand the wipes container on the toilet roll holder.	"It's good to end with wet wipes – if you are unsure or if there is a lot." Regarding the tub hanger: "Results in a good height" (easier to reach) "Fun for the children"	"You can't flush them" Regarding the tub hanger: "Never!" "Wouldn't want it in the home. Then it should be something that suits both adults and kids"

	Fred-die Fish Skeleton soap by Paladone (other aquatic animals also in-cluded in the line)	A bar of soap that inside has a plastic toy the shape of the animal in this case a fish. The encouragement of a toy inside is to make kids want to wash their hands so that they can faster get the toy.	"If I had smaller children I could use this type of product to make it more fun – not to teach them."	"I don't think it helps at all"
	Wett Giggles soap	A nail brush encased in scented sudsy soap The fun characters is to entice kids to use the soap. The nail brush also encourages the nail to be cleaned resulting in very clean hands.		Not sure how it works Does not think it would help teach kids
	Tinkle targets by Mom inventors Inc.	A picture which you place in the toilet. to give boys something to aim at when they are standing and urinating.	"That should all men have!" "If you are go-ing to stand - it is good" "Could help teach boys"	"Boys should not learn to stand when urinating"
	Toilet Buddies by Jeckida Inc.	An entire package of videos and songs, togethr with the stickers to place on the toilet (stickers seen on the picture). To make it more fun and less intimidating to go the toilet as a young child.		Only fun the first time Regarding the childish design: "Then you need almost a kid bathroom and an adult bath-room"

Appendix G

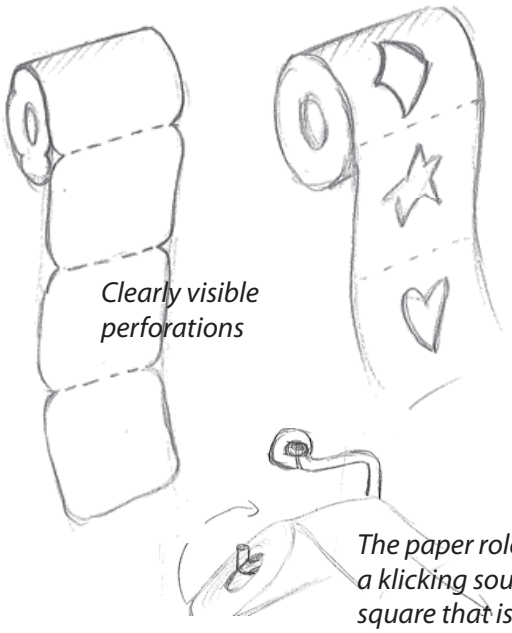
Selection of sketches from idea generation and concept development.

Dispensers for both ordinary toilet paper and wet wipes



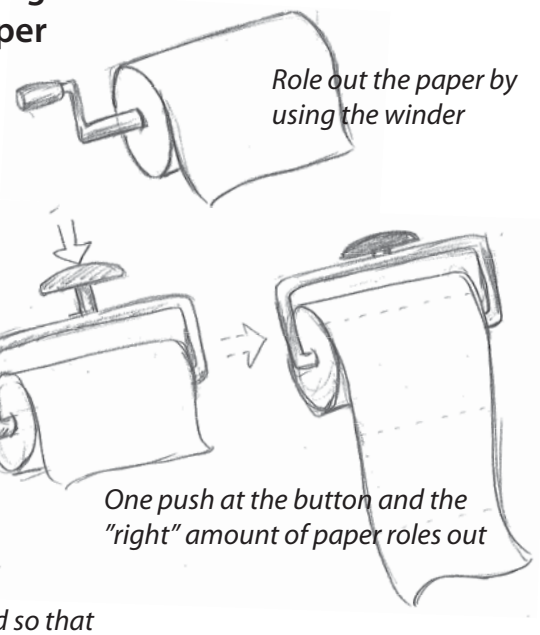
Dispensers that can be attached to the toilet seat for improved availability

Toilet paper that facilitate the teaching of taking appropriate amount of paper



Clearly visible perforations

The paper role is designed so that a klicking sound is heard for each square that is pulled out



Role out the paper by using the winder

One push at the button and the "right" amount of paper roles out

Soap that is spread over a large area of the hand

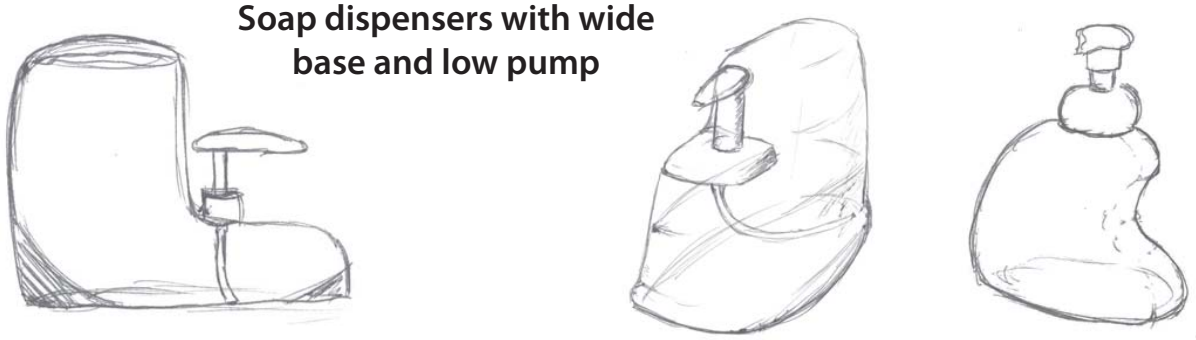
Put the whole hand inside the dispenser

Soap is sprayed over the hand

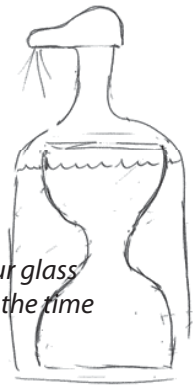
Two colours that mixes when rubbing the hands together

Soap that also comes out on top of the pump head

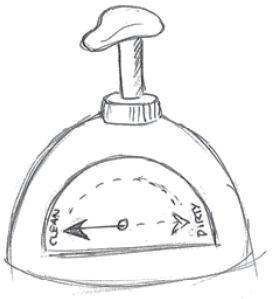
Soap dispensers with wide base and low pump

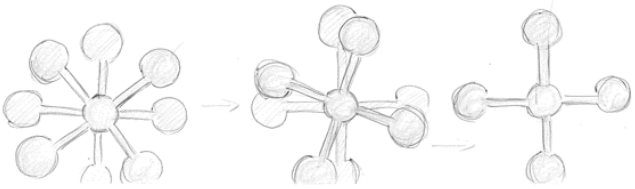


Soap showing time



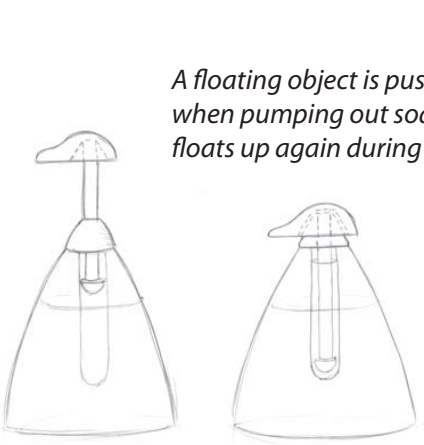
An hour glass shows the time



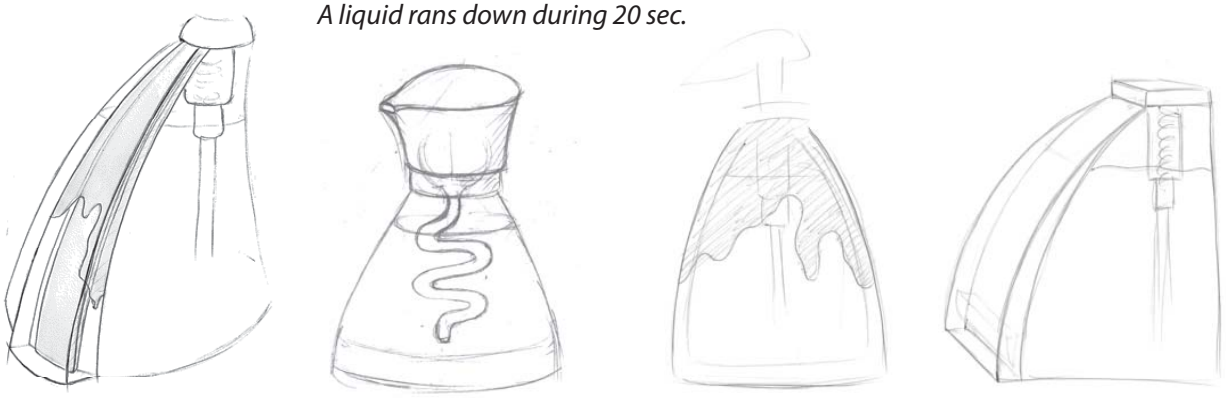


One part of the "flower" is spinning during 20 sec.

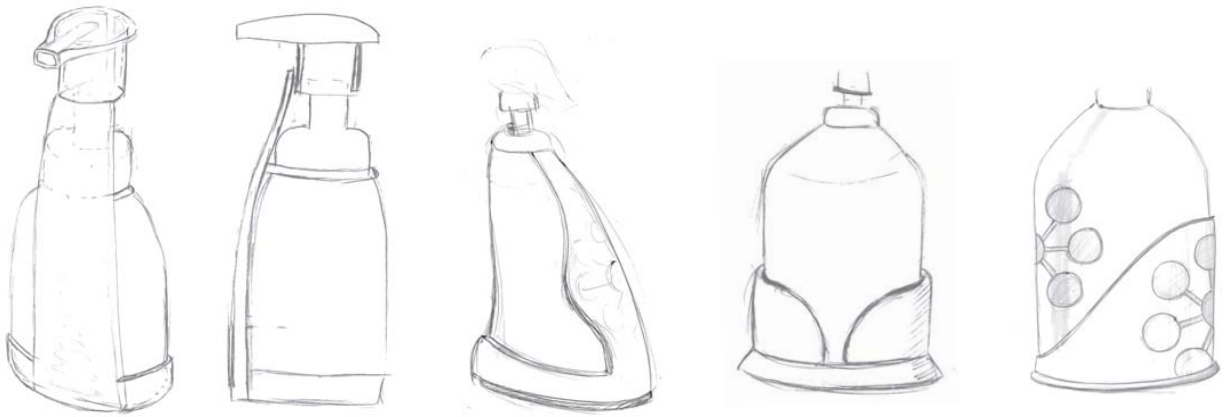
A floating object is pushed down when pumping out soap, and then floats up again during 20 sec.



A liquid rans down during 20 sec.



Placement of electronic timer



Tvål och toalettpapper i barnfamiljer

Hej!

Syftet med den här enkäten är att få reda på föräldrars åsikter om tvål och toalettpapper i hemmet. Enkäten riktar sig till föräldrar med barn under 10 år som tvättar händerna själva. Den kommer att ta max 15 minuter att fylla i.

Tack på förhand!
Mvh Frida och Sofia

Kön

- ❑ Man
- ❑ Kvinna

Hur många barn har du?

- ❑ 1
- ❑ 2
- ❑ 3
- ❑ 4
- ❑ 5
- ❑ 6
- ❑ 7
- ❑ >7

Hur gamla är dina barn?

Ange ålder för varje barn

	1 år	2 år	3 år	4 år	5 år	6 år	7 år	8 år	9 år	10 år	>10 år
Barn 1	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
Barn 2	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
Barn 3	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
Barn 4	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
Barn 5	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑
Barn 6	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑	❑

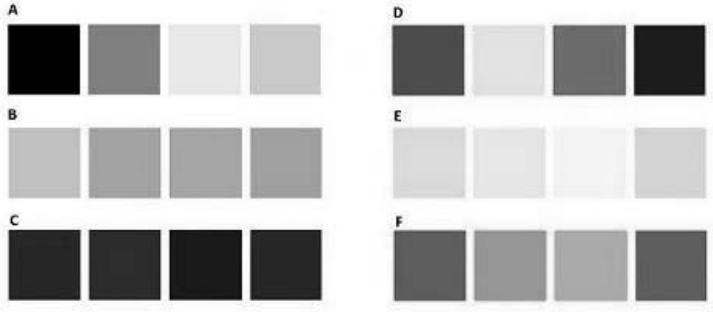
Hur många badrum har du i ditt hem?

- ❑ Ett badrum
- ❑ Två badrum
- ❑ Tre badrum
- ❑ Fyra badrum
- ❑ Övrigt _____

Är det viktigt för dig att saker och ting matchar i ditt badrum?

- ❑ Ja
- ❑ Nej
- ❑ Övrigt _____

Vilka typer av färger tycker du om att ha i ditt badrum?



Nedan ser du exempel på några färgtyper. Gradera på skalan 1-5 vad du tycker om varje färgtyp.

	Gillar inte alls 1	2	3	4	Gillar mycket 5
A: Neutrala färger	❑	❑	❑	❑	❑
B: Naturfärger	❑	❑	❑	❑	❑
C: Dova/djupa färger	❑	❑	❑	❑	❑
D: Klara färger	❑	❑	❑	❑	❑
E: Pastellfärger	❑	❑	❑	❑	❑
F: Starka färger	❑	❑	❑	❑	❑

Vad använder du för tvål? Varför använder du den tvålen?

Du kan välja fler än ett alternativ.

- ❑ Flytande tvål för att _____
- ❑ Hårdtvål för att _____
- ❑ Skumtvål för att _____
- ❑ Övrigt _____

Skulle du ha valt en annan typ av tvål om du hade haft möjlighet? I så fall vilken?

_____
_____
_____
_____

En behållare för flytande tvål har oftast en pump för att få ut tvålen. Skulle du kunna tänka dig en behållare där man får ut tvålen på ett annat sätt än med en pump?

- ❑ Ja _____
- ❑ Nej _____
- ❑ Övrigt _____

Appendix H

Questionnaire idea evaluation and requirement research.

Vad är viktigt för dig när du köper tvål? Dvs. vad baserar du ditt tvålinköp på?

Gradera på skalan 1-5 för varje kategori

	Inte alls viktigt				Mycket viktigt
	1	2	3	4	5
Lukt	❑	❑	❑	❑	❑
Färgen på flaskan (eller tvålen om flaskan är genomskinlig)	❑	❑	❑	❑	❑
Märke	❑	❑	❑	❑	❑
Pris	❑	❑	❑	❑	❑
Miljöpåverkan	❑	❑	❑	❑	❑
Utformning/design	❑	❑	❑	❑	❑
Vad barnet vill ha	❑	❑	❑	❑	❑

Övrigt

_____

Hur viktiga är följande egenskaper för dig när det gäller pumptvålens behållare?

	Inte alls viktigt				Mycket viktigt
	1	2	3	4	5
Att den rymmer mycket tvål	❑	❑	❑	❑	❑
Att den har en bra "pumpknapp"	❑	❑	❑	❑	❑
Att man kan se tvålen	❑	❑	❑	❑	❑
Att den är lätt att fylla på	❑	❑	❑	❑	❑
Att behållaren/tvålen har en fin färg	❑	❑	❑	❑	❑
Att den har en fin form	❑	❑	❑	❑	❑
Att den står stabilt	❑	❑	❑	❑	❑

Hur viktigt är det att tvålen passar in designmässigt i ditt badrum?

Inte alls viktigt				Mycket viktigt
1	2	3	4	5
❑	❑	❑	❑	❑

.

Vilken av tvålarna nedan (A-F) skulle du välja att köpa baserat på utseendet?
Tänk dig att du har ett barn i åldern 3-6 år (om du inte redan har det). När du rangordnar utgå från hur du faktiskt hade valt och inte hur du tror att du borde välja.

Rangordna tvålarna från 1-5.
1 är den du helst hade köpt.
5 är den som du minst kan tänka dig att köpa.

A _____
B _____
C _____
D _____
E _____
F _____

Motivera valet för den som du graderat bäst resp sämst. Skriv ex: "jag tycker bäst om B för att... och tycker sämst om D för att..."

_____
_____
_____
_____

Köper du handtvål utifrån vad ditt barn gillar eller vad du gillar?

- ❑ Utifrån vad mitt barn gillar
- ❑ Utifrån vad jag gillar
- ❑ Vet ej
- ❑ Övrigt

Varför?

_____
_____

Köper du barn-handtvål till ditt/dina barn?

❑ Ja
❑ Nej

Varför köper du barn-handtvål?

❑ Barntvål är mildare och skonsammare för barnet
❑ Utformningen/designen av de flesta tvålbehållare gör att mitt barn tycker det blir roligare att tvätta händerna
❑ En barntvål är oftast bättre anpassad för ett barn och därmed lättare för barnet att använda
❑ Mitt barn vill ha det.
❑ Övrigt _____

Använder hela familjen barn-handtvålen?

❑ Ja
❑ Nej, har en separat handtvål till vuxna

Varför?

_____
_____
_____
_____

Varför köper du inte barn-handtvål?

❑ Det är onödigt, mitt barn kan lika gärna använda samma tvål som jag
❑ De passar oftast inte in färgmässigt i mitt badrum
❑ Jag tycker inte om motivet på barntvålar
❑ Jag brukar inte tycka om lukten på barntvålar
❑ Övrigt _____

Tycker du att det är bra med produkter som endast riktar sig till barn? Dvs produkter som är tänkta att tilltala barn och endast användas av barn.

❑ Ja
❑ Nej
❑ Vet ej

Kommentar

_____
_____
_____
_____

Nedan ser du en bild på en tvål för barn. När barnet trycker på tvålpumpen blinkar en lampa i figurens ögon. Lampan blinkar i 20 sekunder för att visa barnet hur länge man bör tvätta sina händer.

Vad tycker du om denna idé för att få barn att tvätta händerna noggrant? Fokusera endast på produktidén och inte på utseende eller annat.

	Mycket dålig idé				Mycket bra idé
	1	2	3	4	5
.	❑	❑	❑	❑	❑

Varför tycker du så?

_____
_____
_____
_____

Nedan ser du en bild på en tvål för barn. När barnet trycker på tvålpumpen stämplas en röd prick i handen. Tanken är att barnet ska tvätta händerna tills pricken i handen har försvunnit. Syftet med detta är att få barnet att tvätta händerna noggrant.

Vad tycker du om denna idé för att få barn att tvätta händerna noggrant?

	Mycket dålig idé				Mycket bra idé
	1	2	3	4	5
.	❑	❑	❑	❑	❑

Varför tycker du så?

_____
_____
_____
_____

Nedan ser du en bild på ett hjälpmedel för att få barn att tvätta händerna

tillräckligt länge. Barnet trycker på knappen med en bild av en hand när han/hon ska tvätta sina händer. En lampa börjar då lysa grön och efter 20 sekunder lyser en annan lampa röd för att meddela att banet kan sluta tvätta sina händer. Syftet med denna produkt är att barnet ska lära sig hur länge man bör tvätta sina händer.

Vad tycker du om denna idé för att få barn att tvätta händerna noggrant?

Mycket dålig idé				Mycket bra idé
1	2	3	4	5
❑	❑	❑	❑	❑

Varför tycker du så?

_____
_____
_____
_____

Vad skulle du tycka om en produkt i badrummet som avger ett ljud vid användning för att till exempel meddela tid?

Mycket dålig idé				Mycket bra idé
1	2	3	4	5
❑	❑	❑	❑	❑

Kommentar

_____
_____
_____
_____

Följande frågor handlar om toalettpapper och våtservetter.

Föredrar du toalettpapper på rulle eller toalettpapper i vikta bitar likt det som finns på en del allmänna toaletter?

Tänk endast på vilken du tycker om att använda, inte om det går att köpa till ditt hem.

- ❑ Toalettpapper på rulle
- ❑ Toalettpapper i vikta bitar
- ❑ Övrigt _____

Varför tycker du så?

_____
_____
_____
_____

Använder du och/eller ditt barn våtservetter som komplement för torkning efter att ha kissat eller bajsat? Alltså, t ex torkar först med vanligt torrt papper och avslutar med en våtservett.

- ❑ Ja, hela familjen använder våtservetter vid torkning
- ❑ Ja, men endast mitt/mina barn använder våtservetter vid torkning
- ❑ Nej, men vi använder våtservetter till annat
- ❑ Nej, vi använder inte våtservetter vid torkning men skulle gärna göra det om de gick att spola ned i toaletten
- ❑ Nej, vi använder inte våtservetter alls
- ❑ Övrigt

Kommentar

_____
_____
_____
_____

Nedan ser du en bild på en behållare för våtservetter som ska användas vid torkning efter toalettbesök. Föreställ dig att våtservetterna är spolbara. Behållaren kan fästas på de vanligaste typerna av pappershållare.

Vad tycker du om idén att fästa en behållare för våtservetter på din befintliga pappershållare? Tänk endast på funktionen och inte designen.

Mycket dålig idé				Mycket bra idé
1	2	3	4	5
❑	❑	❑	❑	❑

Varför tycker du så?

_____
_____
_____
_____

Vad anser du vara lagom mängd toalettpapper efter att man kissat?

1 ruta = ca 1 dm

- ❑ 1 ruta
- ❑ 2 rutor
- ❑ 3 rutor
- ❑ 4 rutor
- ❑ 5 rutor
- ❑ 6 rutor
- ❑ 7 rutor
- ❑ 8 rutor
- ❑ 9 rutor
- ❑ 10 rutor

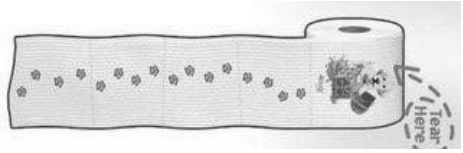
När man har bajsat, vad anser du då vara lagom mängd toalettpapper för varje tork-omgång? (Alltså inte hur många du tror krävs totalt för att bli ren.)

1 ruta = ca 1 dm

- ❑ 1 ruta
- ❑ 2 rutor
- ❑ 3 rutor
- ❑ 4 rutor
- ❑ 5 rutor
- ❑ 6 rutor
- ❑ 7 rutor
- ❑ 8 rutor
- ❑ 9 rutor
- ❑ 10 rutor

Nedan ser du en bild på ett toalettpapper för barn. Illustrationen på pappret visar hur stor mängd barnet bör använda vid ett toalettbesök.

Vad tycker du om denna produktidé för att få barn att lära sig ta "rätt" mängd toalettpapper?



Mycket dålig idé				Mycket bra idé
1	2	3	4	5
❑	❑	❑	❑	❑

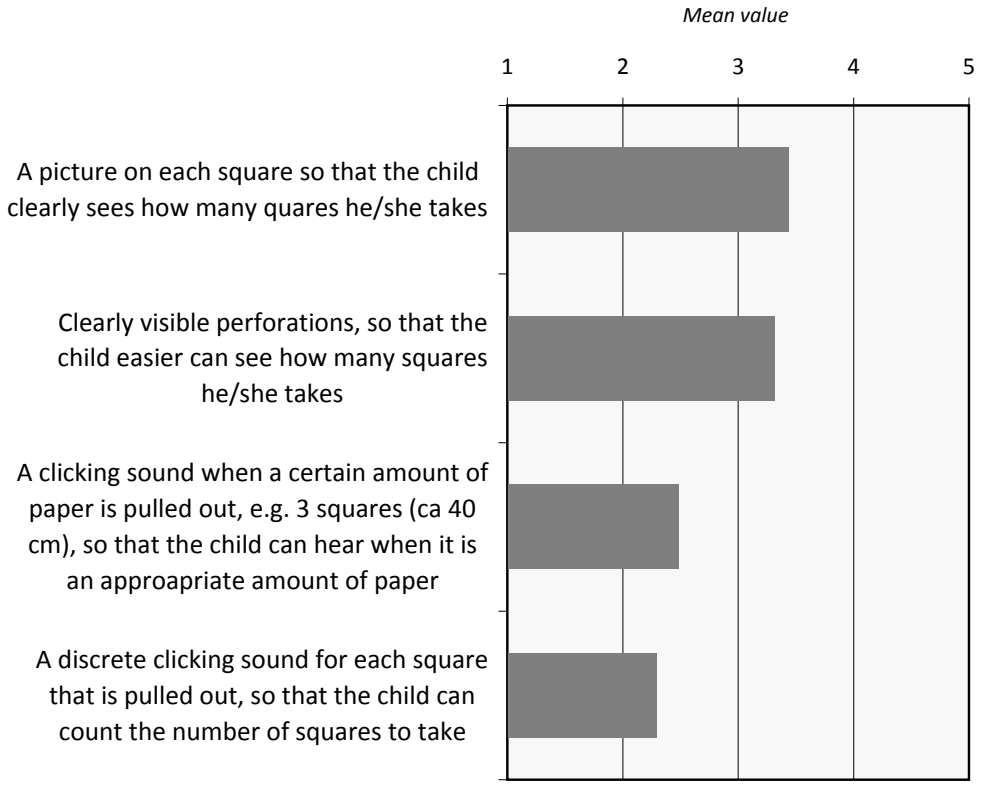
Varför tycker du så?

_____
_____
_____
_____

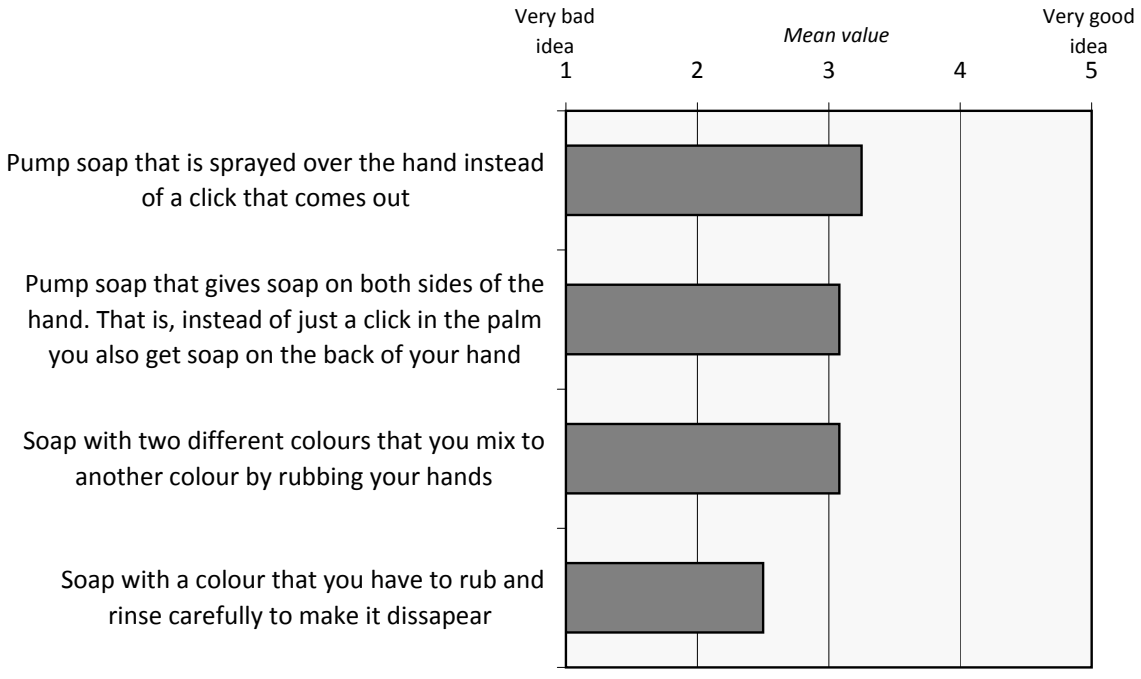
Appendix I

Result from questionnaire idea evaluation and requirement research.

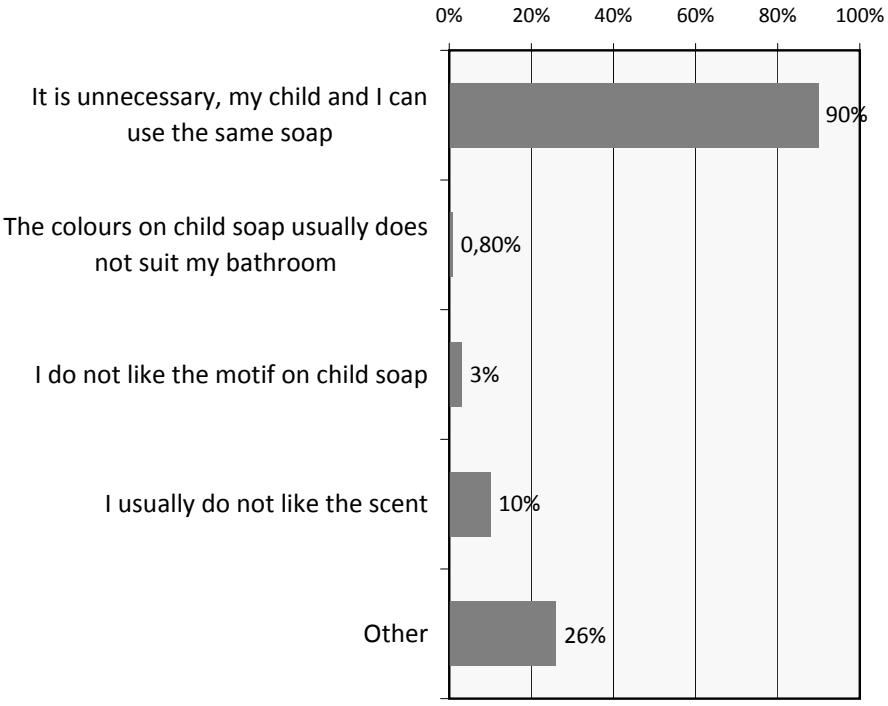
What do you think about the ideas below to help children take appropriate amount of paper?



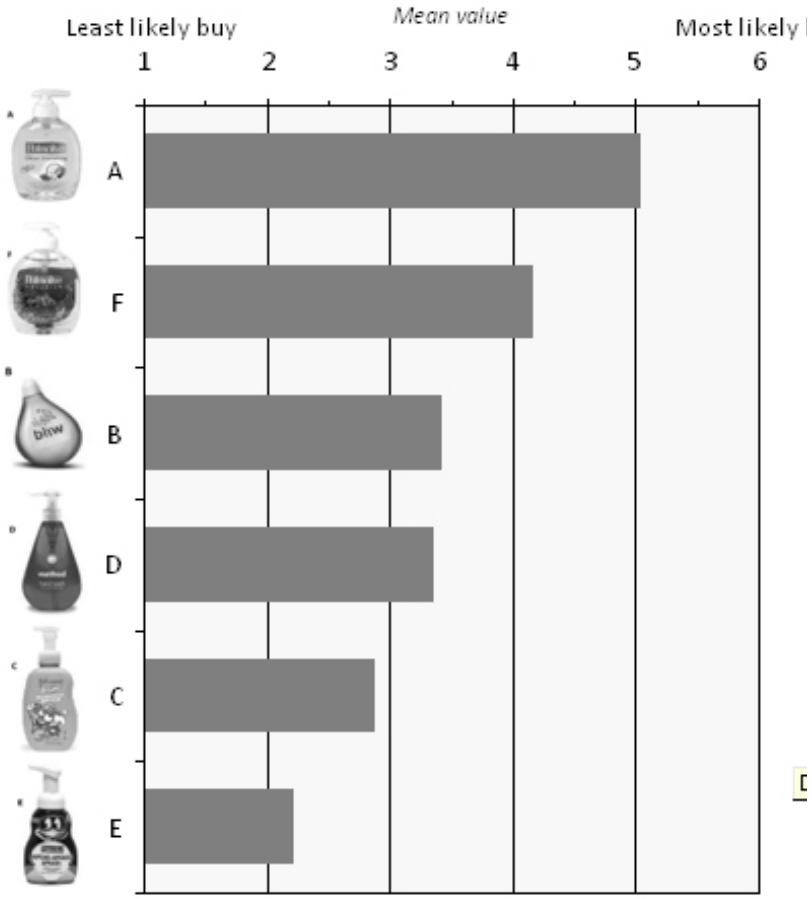
Many children do not wash their hands careful enough. What do you think about the ideas below to get children to wash their hands more careful?



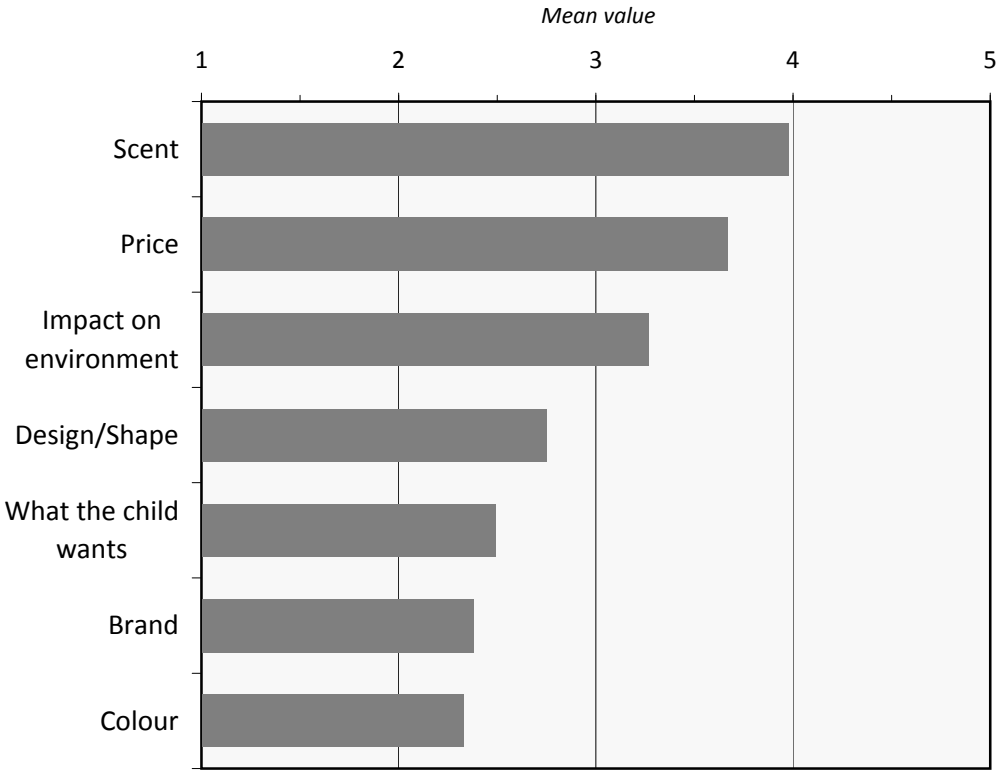
Why do you not buy handsoap designed for children?



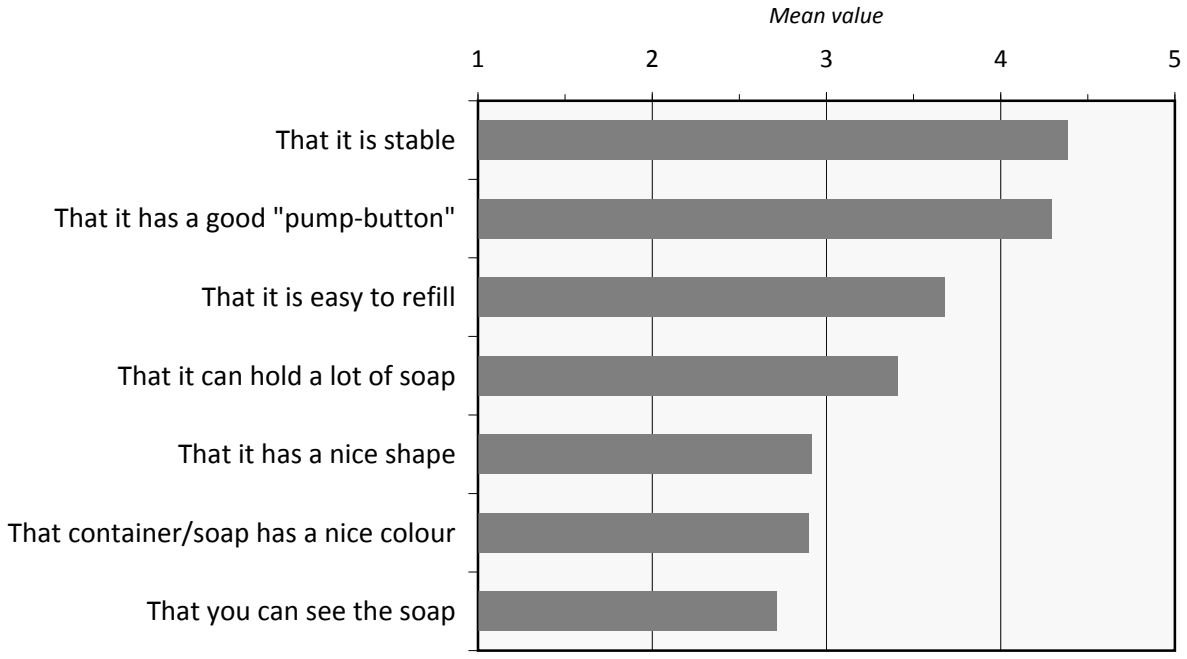
Which one would you most likely buy?



What do you base your soap purchase on?



How important are the following attributes of a pump soap dispenser?



Appendix J

Persona

In the two story house in blabla in Gothenburg lives the Anderson family; a four year old boy, a teenage girl and their mother and father. The father is a police and the mother is a nurse. Every year the family goes on either a ski holiday or a beach holiday. They also got a summer house outside Gothenburg which they like to spend their summers. Sometimes the father likes to play outside with his four year old son.

There is only one bathroom in the house which is sometimes a problem since the teenage girl spends a lot of time in the bathroom in the mornings. A lot of soap and paper is also consumed, mostly due to that the four year old tend to take to large amount of both paper and soap even though the parents try to learn how much soap and paper to take, but the for year old does not understand better and eventually he will learn. The mother who is a nurse thinks it is very important with the hygiene and she believes that it is important to learn good hygiene habits in an early age. But it can be quite hard to teach a four year old who wants to do everything by himself and wants to go playing rather than washing hands carefully.

The Andersson family

Appendix K
Demand specification

SOAP		Importance				
Category	**Criteria description**	**5**	**4**	**3**	**2**	**1**
Technical						
T1	The soap shall have a mild fragrance/scent	x				
T2	The soap shall be gentle on the skin	x				
T3	The product should be easy to manufacture		x			
T4	The dispenser should *not* drip/leak	x				
T5	The dispenser shall be refillable	x				
T6	The dispenser should collect soap to allow for all the soap to be pumped out					x
T7	Time showing component should be on the soap container		x			
T8	The dispenser should be robust and not break if it falls of the wash basin		x			
T9	The dispenser components should be standard components			x		
T10	The dispenser should not be more than 2 cm higher than today's standard soaps		x			
Handling						
H1	The dispenser shall be able to be used with one hand by an adult	x				
H2	The dispenser should be able to be easily used by a 50 percentile 4-year-old Scandinavian child	x				
H3	The dispenser should be able to be easily used by a 50 percentile 2-year-old Scandinavian child			x		
H4	The dispenser shall be stable enough to not tip over easily	x				
H5	The dispenser should be able to be refilled easily – approx. with less than 5 steps			x		
H6	The product should facilitate the spreading of soap on the hands		x			
H7	The time showing component should be easily seen by a 50 percentile 2-year-old Scandinavian child when standing by the wash basin		x			
H8	The dispenser could be able to be locked for easy transportation when travelling					x
H9	The time showing component should be activated when pushing the pump for soap	x				
Maintenance						
M1	The dispenser should be easily cleaned		x			
M2	The dispenser should *not* collect dirt		x			
M3	Should be able to easily change batteries	x				
Design (semantics etc.)						
D1	The product shall appeal to children between the ages 4-6	x				
D2	The product should appeal to children under the age of 4 and over the age of 6			x		
D3	The product should appeal to the entire family (incl. mother, father and siblings)	x				
D4	The dispenser's semantics shall be adapted to the mental capacity of a 4 year-old	x				
D5	The product shall be pedagogical	x				
D6	The product should communicate SCA brand and values		x			

Environmental (refers to entire lifecycle)						
En1	The product should be manufactured from materials that are as environmentally friendly as possible	x				
En2	The dispenser should be able to be transported with minimal environmental impact				x	
En3	The electronics should be able to be easily removed for recycling	x				
En4	The soap should be biodegradable	x				
En5	The dispenser should be able to be recycled			x		
Economical						
E1	The product should be of a reasonable price (first time buy should cost up to approx. 40 SEK and refill around 20 SEK)				x	

5 – Necessary
4 – High desirability
3 – Desirable
2 – Low desirability
1 – Not of importance

TOILET PAPER		Importance				
Category	**Criteria description**	**5**	**4**	**3**	**2**	**1**
Technical						
T1	The toilet paper shall be as a roll	x				
T2	The toilet paper should be soft	x				
T3	The toilet paper should be easy to manufacture with today's methods	x				
T4	The perforations should be of high quality		x			
T5	The toilet paper shall have good absorption ability	x				
T6		x				
Handling						
H1	The toilet paper should be appropriately easy to tear off	x				
Design (semantics etc.)						
D1	The product shall appeal to children between the ages 4-6	x				
D2	The product should appeal to children under the age of 4 and over the age of 6			x		
D3	The product should appeal to the entire family (incl. mother, father and siblings)	x				
D4	The product semantics shall be adapted to the mental capacity of a 4-year-old	x				
D5	The product shall be pedagogical	x				
Environmental (refers to entire lifecycle)						
En1	The product shall be to a large extent manufactured from recycled materials	x				
En2	The product should be able to be transported with minimal environmental impact				x	
Economical						
E1	The product should be of a reasonable price (around the price range of Edet®)				x	

Appendix L

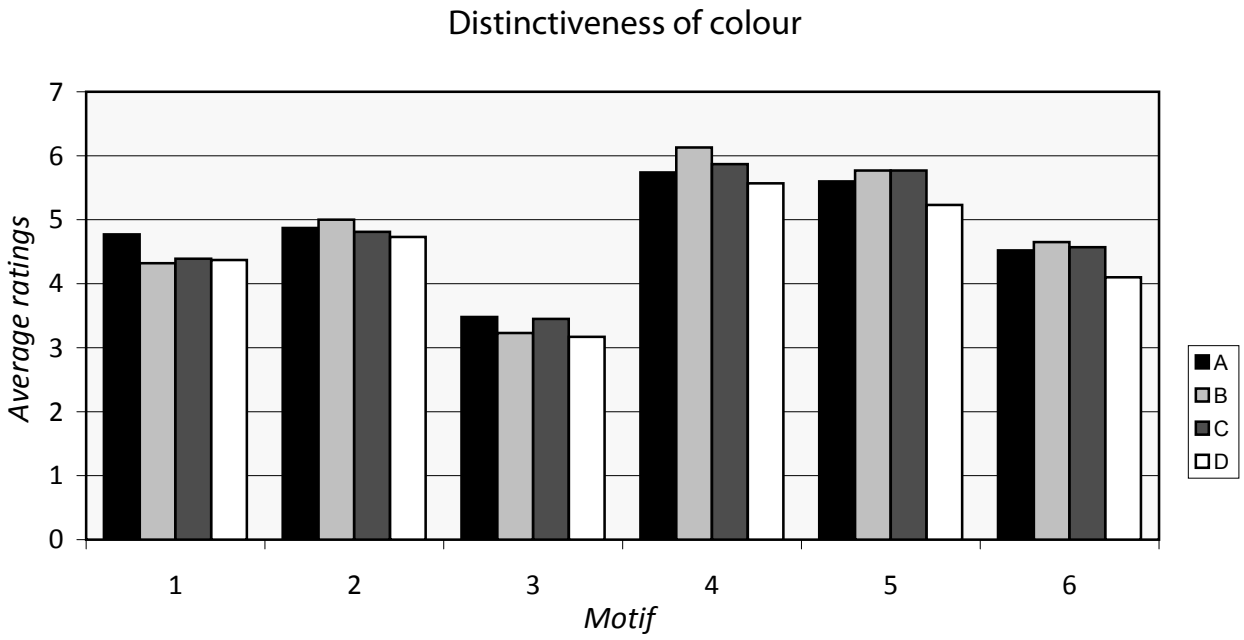
Imageboard of adult vs. child design

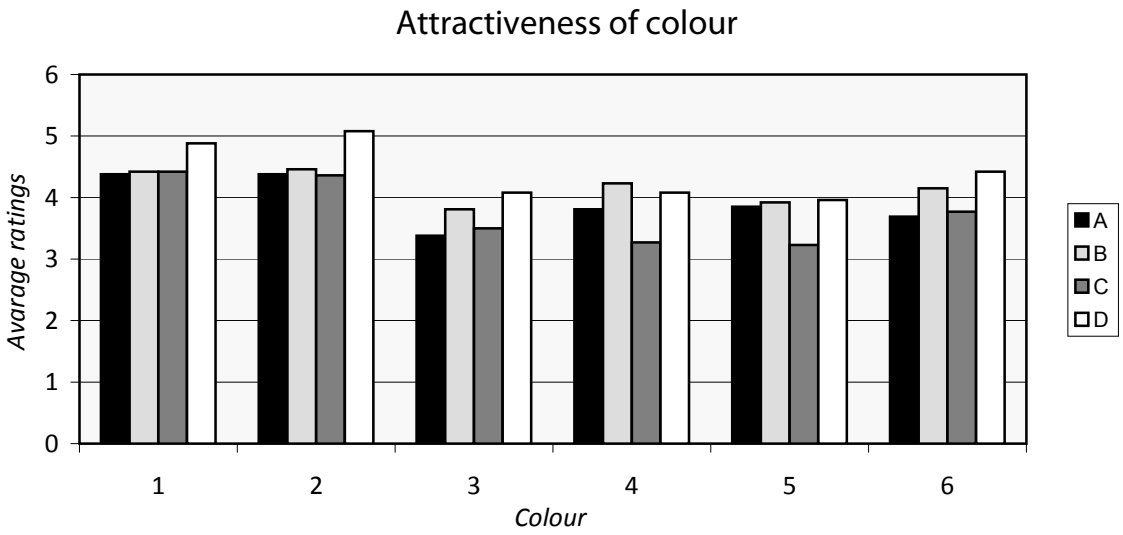
Appendix M

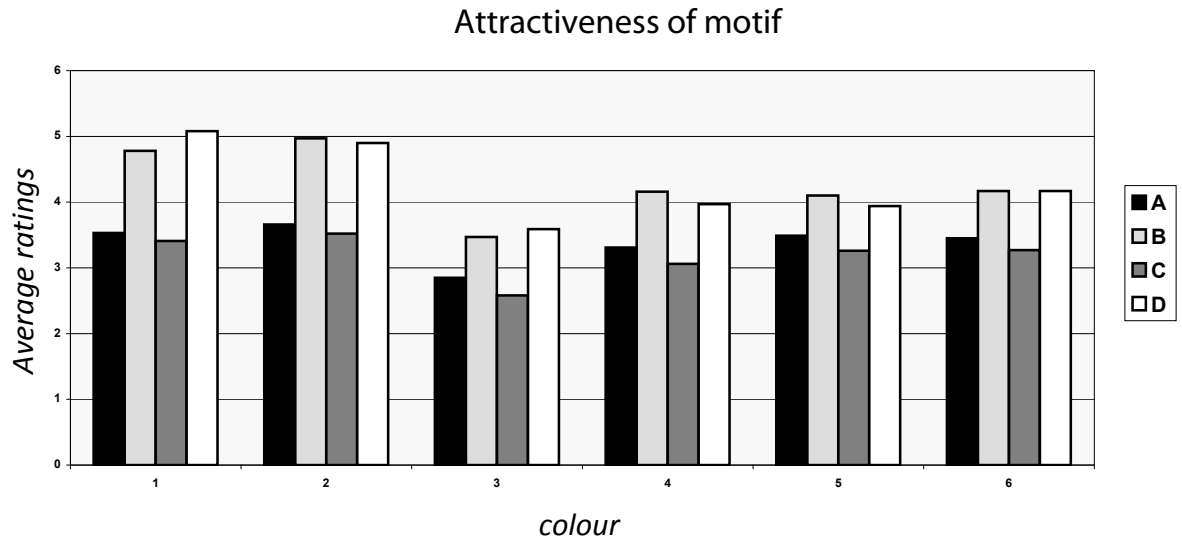
Imageboard of motif appealing for both adults and children

Appendix N

Result from questionnaire evaluation of motifs.




Attractiveness of colour
Avarage ratings
0
1
2
3
4
5
6
1
2
3
4
5
6
Colour
A
B
C
D


Attractiveness of motif
Average ratings
0
1
2
3
4
5
6
1
2
3
4
5
6
colour
A
B
C
D

Appendix O

Pros and cons of the electronic concepts.

Concept A

Pros
- Can be turned on without having to be standing on a surface

Cons
- Specially made pump head
- Electronics on moving parts can make it more fragile
- Wires from pump head to display on bottle
- And so on…

Concept B

Pros
- Collected electronics
- Can be turned on without having to be standing on a surface

Cons
- The pump is not able to be locked without removing the outer part
- Does not work with all types of pump heads
- Protruding parts
- More difficult to clean
- Outer part needs to be removed to be refilled

Concept C

Pros
- The pump is able to be locked without removing the outer part
- Works easily with all types of pump heads
- No protruding parts
    - Easy to clean
    - Calm and collected expression
- Collected electronics
- Easily refillable because no parts connected to the pump head

Cons
- It might turn on when putting it down
- Electronics close to water on wash basin

Appendix P

Measures of the soap dispenser and the timer.