



Developing & designing an interactive application for teaching teenagers about sustainable fashion

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dutch sustainable

— — — FASHION WEEK — — —

*Graduation Project for the
Dutch Sustainable Fashion Week*

SAXION
HOGESCHOOL

Saxion University of Applied Sciences

ABSTRACT

The Dutch Sustainable Fashion Week reaches many audiences with their message about sustainable fashion, but notably struggles to reach teenagers. Previous research done for the DSFW by Been et al (2019) suggested to them to look towards interactive application, such as e-learning or games to tackle this audience gap.

This report will tackle the creation & design of one such application, going through the whole process: What do the target audience want and how can they be reached? After initial research & a survey, early findings showed this to be the label scanner idea.

The label scanner was an idea where one could scan a label and then see what the materials & country in the label meant. After developing a prototype and testing that directly it took a sharp decline in popularity, potentially due to issues with the prototype, rather than the idea. Observations during the testing indicate that there was enthusiasm for the idea, but issues with the prototype soured the test.

Finally, the creation of the application – explaining each of the technical challenges of setting up this label scanner. How it is hosted, how a scanner would work. A future developer can come in and read these findings, creating their own version of the label scanner using them.

THANK WORD

Thank you to my company coach, Alexandra Linn & my graduation coach, Johannes de Boar for guiding me through the graduation period. Thank you for my circle group for helping answer any questions asked far too late in the evening.

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1. INTRODUCTION

This is the graduation report for Creative Media & Game Technology student Rick Oosthof for the Dutch Sustainable Fashion Week.

1.1. The Company

According to their website, The Dutch Sustainable Fashion Week (DSFW) was founded in 2010 by Cécile Scheele and is a foundation looking to inform both consumer and the fashion industry about sustainable fashion. Every year around October they have one specific week, in 2022 it is from the 6th to the 12th of October. This Sustainable Fashion week is full of workshops, industry gatherings & fashion shows where they in collaboration with the whole fashion industry showcase & celebrate the alternatives to unsustainable fashion. From alternatives to common materials, to promoting secondhand shopping and clothing swaps as well as bringing light to the unsustainability of current fast fashion.

People: Improve the lives of people, those around them and, say, the factory workers who make their clothes.

Planet: Save our planet, keep both the local environment intact and help halt climate change.

Prosperity: Do all of this without reducing prosperity and leading a less fulfilling life.

Figure 1 A short explanation of people, planet, and prosperity. From interview with Linn (2022, April 1).

1.2. The Assignment

The assignment was triggered by an earlier student research from the Fashion and Textile Technology study at Saxion, Enschede, performed by Beens et al. (2021). They performed a survey on teenagers (12-18, Dutch high school ages) & their knowledge about sustainable fashion to find out how the DSFW could reach this currently untapped target audience. This graduation assignment comes from one of the recommendations of this student research that the DSFW wants to explore further.

The recommendation: An e-learning platform or game to share with teenagers, either directly via social media or via schools to teach them about sustainable fashion & help them making choices in their clothing purchases that value **People, Planet, and Prosperity** –the idea being that good social development can only happen when all three are thought of (DSFW, 2020).

The platform or game should show the fashion industry's impact on the environment, on the working conditions & the environmental impact once clothing reaches its end-of-use stage. The creation of this prototype will be done with two developers:

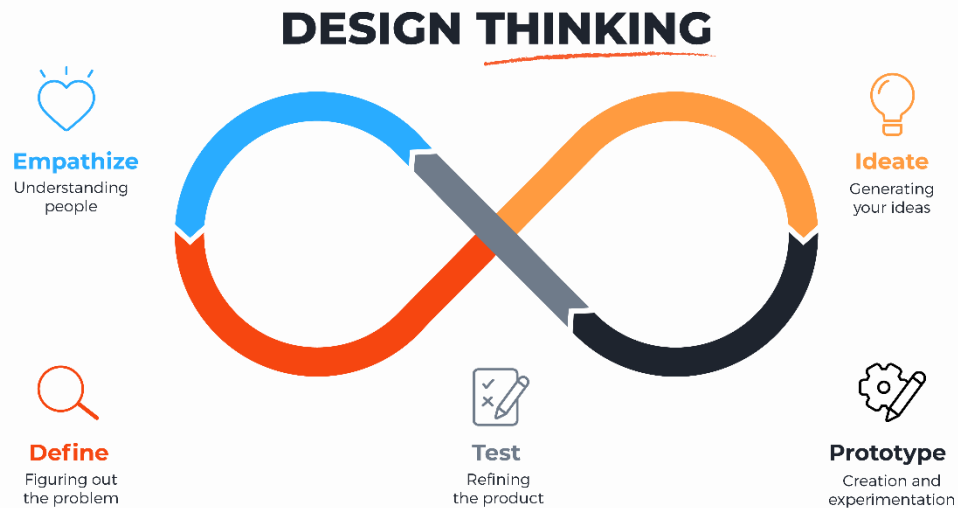
Rick Oosthof as designer & programmer.

Sebastian Surwehme as designer & artist.

This report will focus on the work of Rick Oosthof, though a large chunk of both the initial research & the initial ideate phase were done in heavy collaboration and will thus be similar – work done in collaboration or by Sebastian will be noted as such.

1.3. Structure

Figure 2 The five phases of design thinking



Note. From *The Design Thinking Process*, by S. Karl, 2020. Copyright 2020 by MAQE.

As mentioned by Plattner (N.D.) in the Introduction to Design Thinking, as well as shown in Figure 2 by Karl (2020), design thinking consists of five phases:

- **Empathize**
In empathize a connection is made with the target audience, what do they do and why? What are their needs, how do they think about the world? After all, it is a problem for them that needs to be solved.
- **Define**
It is clear what the needs and feelings of the target audience are, but what is the problem that is going to be tackled? The more clearly defined the problem is, the easier it will be to craft a specialized solution.
- **Ideate**
Create a wide array of solutions to the problem, the more the better. Then narrow them down, be realistic and look at the needs of the target audience and the client.
- **Prototype**
Take the solutions that came out of the ideate phase and develop prototypes for them. This could be paper prototypes, sticky notes on a whiteboard or a fully developed technical prototype – as long as it has interaction for users to play with.
- **Test**
Take the created prototypes and present them to the target audience. Do they tackle the problem? What is good about them? What is wrong about them? Find out what needs to be changed. And repeat the process.

Afterwards, the phases are repeated – starting either back at Ideate or Empathize, depending on the problem. Although the phases of the process will not be explicitly stated, the work done, and the report are structured using it. Starting with the empathize section by doing user research, followed by defining the problem.

2. INITIAL RESEARCH

Before there can be any development of the prototype, the student paper should be summarized and confirmed and areas that are important to the rest of the paper should be familiarized with.

The work here was done individually by both Sebastian & Rick, with each tackling the research on their own. Afterwards, research was compared and checked with the DSFW to ensure it was correct, but the research below is primarily the individual work of Rick.

2.1. Research Plan

To start with setting up a plan for the research, a simple research question to focus on will be used.

The research question is as follows:

How can the DSFW inform Dutch teenagers aged 12-18 that spend money on clothing about the sustainability of clothing through e-learning or gamified learning so that their future clothing choices respect People, Planet and Prosperity?

This research question will be divided into three categories:

Company: The DSFW, what options do they have access to? What are their limitations?

User: Teenagers, aged 12-18. What is important to them? What do they know about sustainable fashion? How can they most effectively be reached?

Market: The fashion market. What is sustainable fashion? What is unsustainable fashion? What options do consumers have to becoming more sustainable?

To achieve this, primary sources, and already existing research from the DSFW were used for the company section. Market research was done via sources provided by the experts of the DSFW, they know what they want to teach – this was then compiled in the market section, 2.4.

The user section will use sources from google scholar as well as the various databanks that Saxion has access to. Looking to gather as much accurate and relevant reading material to compile information on the target audience. A mixture of the following keywords was used to find the relevant papers:

User: *social media, teenagers, marketing, social marketing, influencers, advertising, increase awareness, social development*

These papers will then be checked for relevancy using the CRAAP test & by comparing them with Sebastian's findings. The results of these findings will be summarized below in section 2.3. User.

To ensure the quality of the desk research the CRAAP test is used for the sources found via this search and then compared with Sebastian's work. As described by the California State University (2010), the CRAAP test is a method which contains 5 components of its evaluation of sources:

- Currency (The source is relevant; Up to date; Links are working)

- Relevance/Reliability (The information is relevant; Audience is appropriate; Readership level is understandable; Variety of sources consulted; Comfortable citing this in paper)
- Authority/Author (Author has appropriate credentials/skills; Contact information; Organization relevant)
- Accuracy (Sourcing is clear; Evidence is used; Peer reviewed; Verifiable; Unbiased; Error free)
- Purpose (Purpose & intentions clear; Information is fact or supported opinion; Objective; Not biased)

By checking every source, it should be clear which are viable to use, and which are not.

2.2. Company

The primary responsibility of the DSFW will be maintaining and spreading the final product. Thus, it is important to consider the capabilities of the DSFW, a low budget would remove options, for example. In a chat with Rietveld, E. (2022, February 17) as well as talks with Linn, A. (2022, January – June), the DSFW has indicated it has access to the following ways to reach its audience:

- Participating stores, specifically smaller things like posters
- Social media:
 - TikTok
 - Instagram
 - Facebook (Not preferred, due to comparatively smaller presence)
- The DSFW website
- Many, many industry contacts.

There is, however, no advertising budget: Something like targeted advertisements is out of the picture. The social media are all volunteer ran, and the participating stores and activities are all on the same volunteer basis.

2.3. User

The target audience is 12-18 as that is the age of high schoolers in the Netherlands, they need to specifically be buying their own clothing so that they can make choices in that. Although this does skew the actual target audience to the older side, it is common in the Netherlands to give teenagers money to buy their own clothing, both to teach them how to handle money & to let them express themselves with a common start date for clothing money being 12. (Nibud, 2022).

In terms of developmental phase, as mentioned by Rogels (2014) this is when they learn communication and socialization. They want to belong & make friends and thus also struggle with lots of insecurities. Tribalism starts and they want to dress like their group. This also means that the opinion of their peers starts mattering more to them than the opinion of their elders. Finally, this sense of belonging also means they start developing an ideology, caring about larger causes together with their tribe. This includes things like sustainability, the environment, or worker's rights.

As for reaching them, social media and the internet are key. Teenagers spend more time on their phones than any other generation. Specifically on social media platforms like TikTok or Instagram (Seo, 2013). To

reach them on there, it is important to add easily shareable content, such as images, links, or even just simple hashtags. The easier it becomes to spread, the better (Kostygina et al, 2020).

The less steps before they reach the information the better – every extra step or click will mean a drop-off in users who reach the content (Bird & Tapp, 2008). Finally, an alternative to social media that the DSFW has access to is physical events, however, only 27% of teenagers surveyed by the student paper (Beens et al, 2021) had any interest in visiting an event, including online events.

Another way of reaching them could potentially be influencers, as Kostygina et al (2020) state that getting influencers, whether big or small has great effects on getting people interested in a product. This could mean taking into consideration how interesting a platform is for producing content, so that influencers get on board. They also mention one downside for DSFW, however, in that influencers have the biggest effect on people already interested in a product category. In this case that would be teens already interested in sustainable fashion who are actively following influencers and content about it.

As for their knowledge about sustainable fashion, 54% does indicate interest in buying more sustainable clothing however they do not know where. 56% indicated having no idea how to recognize sustainable clothing, and 65% do not even know how much sustainable clothing they own, excluding the 8% that know they own no sustainable clothing according to a paper by CNV (Kamphuis et al, 2020).

These numbers return in similar papers, with 72% indicating they have no idea where to buy sustainable clothing in the student research, or in research by Roeyen & Maliadas (2017) that asked students the first brand that came to mind for both the most sustainable and the least sustainable brand the H&M was 2nd place on both ends of the spectrum.

Some of this has to do with the current generation of teenagers generally not trusting companies, the majority do not believe they can ever trust a company to say if something is sustainable or not (Cohen & van der Wijst, 2015). But it does seem like generally there is a lack of knowledge on how to recognize sustainability in fashion. Finally, for secondhand fashion: They generally think it is gross or low in quality. (Beens et al, 2021).

Table 1 Empathy map on Dutch teenagers based on the gathered information.

Empathy Map	Dutch Teenagers
Ages	12-18
Think & Feel	"Buying new things is fun." "Sustainability is important, but I don't want to pay more." "Secondhand clothing is gross." "I don't want to go to events." "I hope my classmates think these clothes look good."
Hear	Global warming. Human rights violations. Pollution & trash. Climate change. Fast fashion ads.
See	Smartphone. Chat groups with friends (WhatsApp, Discord). Advertisements. Social media on a global scale: <ul style="list-style-type: none"> • TikTok, YouTube, Instagram, Twitter • Influencers
Say & Do	What companies should I buy from? What brands are sustainable? I want to be more sustainable. Listen to social media. Throw away mendable clothes. Buy clothes online.
Pains	Don't know what to do. Knowledge gap. Attitude behaviour gap. Emotional spending (FOMO, Addiction). Think they won't be able to make a difference.
Gains	Validation of peers. Self-worth increase. Feeling of doing good.

2.4. Market

To talk about sustainable fashion, it first needs to be said why this is needed: Fast Fashion. Fast fashion is the constant production of new fashion for the cheapest prices possible. According to the documentary Fast fashion - The shady world of cheap clothing by DW Documentary (2022) New catalogues are produced every 4-16 weeks, depending on the company and usually the old ones are thrown out. The goal being to get shoppers to return as often as possible, as there will always be new clothes on the shelves for them

to look at. This documentary and the negative effects of fast fashion it describes can be summarized and divided into the following three categories:

2.4.1. The Workers

Due to the constant demand for clothing, as well as the desire to cut costs clothing companies will often send their orders to the cheapest factories possible. This means low wages & long working times. Often to an extent that is illegal in the actual host country of the factory, taking advantage of immigrants or other vulnerable groups who have no one to defend their rights. (Fair Wear, 2019).

Due to this desire to cut costs, they are often not provided with adequate protection or instruction when working with the toxic materials used in the fashion industry, leading to further health complications for employees.

2.4.2. The environment during production

Almost all fabrics have very high-water costs, leading to water being taken away from elsewhere – this is not necessarily a problem, but this water is not usable for anything after it is used, essentially wasting liters upon liters of water if not purified, which it often is not.

This water problem is confounded by the chemical dumping that often goes in, as the process of making many clothing materials leaves chemical waste. Rather than paying and getting rid of it the proper way, costs are once again often cut, and it simply dumped. (Fair Wear, 2019).

Finally, many of the most common clothing materials such as polyester are made of plastics. This carries with it all the problems of any oil-based product, as well as the fact that most of these materials, such as polyester, are hard to impossible to recycle, leading to more waste and pollution.

2.4.3. Past its lifespan

Since the clothes are made as cheaply as possible, they will often wear out quicker. However, as mentioned, many are not recyclable meaning they end up in a landfill or are burned, even if they were put in the appropriate textile recycling bin as they are simply useless for recycling. Finally, washing these clothes will often lead to micro plastics and chemicals being released into the sewage, which can be very hard to filter out.

So, what is one to do then, if they want to avoid unsustainable clothing? The main options for sustainable fashion are these:

- Mindful purchases: Only buy clothes when they need to, rather than every time there is a new collection.
- Second hand: Buying used clothes.
- Slow fashion: Clothes made with a focus on longevity + recycling, as well as fair treatment of planet, animals, and workers.
- Rental clothes: People do not need to own a suit that they only wear once a month, only to let it rot in their wardrobe: Renting clothes, especially one-off or clothes for special occasions can greatly reduce the total amount of clothing needed in the population.

These solutions, however, do not solve the issue. People do not want to stop buying fast fashion, it is fun and addicting. Much of the focus is thus on improving the sustainability of fast fashion, including new and more recyclable materials, promoting what people need to look out for to figure out how sustainable fast fashion is can then be a major factor in helping companies switch. Not all materials are equally bad, and consumers can in fact lower their impact whilst still participating in sustainable fashion. All the above information was checked with Linn, A. (2022, January – June), an expert in the field of fast fashion, and approved.

It is more and important for companies to look towards sustainability, however, because of its increasing relevancy and impact. (Strähle et al., 2015 & Goossensen, 2019). One example of this is the G7 summit in 2019, where 32 major fashion brands revealed the “Fashion Pact”, which is a plan that aims to switch each of them to 100% renewable energy by 2030. (Boykoff, 2021).

Lastly, for fashion it is important to know what to teach them. The DSFW wants to keep this more fluid, however, and focus on increasing awareness. There are

E-learning has a big impact on the teenage market, being the group who has grown up completely familiar with the internet from a young age. Things like virtual reality for work simulations, e-learning modules for school as well as e-learning software like Duolingo or the many, many self-help e-learning modules for high schoolers needing some extra help (Vesselinov & Grego, 2012). These new methods of learning teach concepts in a fun and engaging way, showing their effectiveness over the years by teaching students of all age groups and impacting their behavior. (Siva, 2019; Batson & Feinberg, 2015).



3. THE PROBLEM

With the greater context made clear, what is it that this paper will be covering?

3.1. Problem Statement

Teenagers are motivated to buy sustainable fashion; environment is an important value to them generally. The main issue they run into is lacking knowledge, they do not know what is sustainable, how to recognize it or who even sells it - thus they can never strive to improve their behavior. They do not go to events, meaning they do not engage in the current offerings of the Dutch Sustainable Fashion week, and they are generally unlikely to participate in store events except for discounts. Thus, they need to be reached directly.

3.2. Main Research Question

How to create an interactive platform that increases the awareness of teenagers that buy their own clothes about sustainable clothing and textiles?

3.3. Sub Questions

To answer the main question, it will be split it in parts to handle first:

1. **What kind of platform would reach teenagers?**
2. **What is the design of said platform and its interactivity?**
3. **What are the technical requirements of the platform?**

First, it is found out what kind of interactive platform needs to be made that would increase the awareness of teenagers about sustainable clothing and textiles. Then, the interactive platform itself is designed and tested.

Finally, the last sub-question tackles the 'create' part of the question by looking at the options and possibilities of coding the platform that was designed in the second sub-question and will hopefully wrap everything up to provide a full answer the main question.

With these questions, this report should function as a guide for future developers to come in and finish the platform.

3.4. Scope

The project will take approximately five months and is created by Sebastian Surwehme and Rick Oosthof. The goal will be to deliver a prototype platform for the DSFW to reach teenagers with. This prototype will not need to be finished but should be tested with the target audience to show its viability as a product.

A list of requirements has been developed for the project & the scope, based on the MoSCoW method. It stands for Must, (o), Should, Could, (o), & Would. (*MoSCoW Prioritization*, 2021). Must have are essential to the project, hard requirements. Should have are requirements that are good to include, but the project is not doomed if it does not have it. Could have is nice, but nothing particularly relies on it. Will not have is something that could perhaps be added in the future but will not be in this iteration of the project.

The list has been generated using the information in chapter 2. Initial Research in collaboration with Sebastian and Linn, A. The following are the hard requirements of the project:

Must have:

- Thoroughly tested UI
- Interactive Elements
- Gamification Elements
- Information is correct
- Educative about textiles & sustainable fashion
- Easy to share
- Engaging with the target audience
- Technical recommendations on further development needs
- Testing done with target audience

Should have:

- Similar visual identity as the DSFW
- Emotional storytelling
- Technical prototypes for feasibility
- Good clean code that can be used as a foundation for further development

Could have:

- 2D animation
- Design with disability in mind
- Sound & Music
- Different Languages

Will not have:

- 3D
- Virtual Reality
- Advertisements
- A finished product
- Perfect code

Finally, within the project there is more experience towards both unity and web frameworks: those will be the primary considerations for the project, compared to say, an android app, simply due to the time constraints.

3.5. Methods

For the methods, each sub-question will be answered separately. It is important to note that some of the methods mentioned will be covered in more detail within the respective sub-question.

3.5.1. What kind of platform would reach teenagers?

This question will start with a short literature study. What do teenagers do on the internet? What are the design requirements for them?

The following keywords will be used: *Teenager, internet usage, UX, design requirements*

Following this research, and with both the new and old information from the initial literature study in mind, the ideate phase will begin. Here, many ideas will be created, regurgitated, and combined into new ones until a list of ideas to solve the problem have been generated. What kind of platforms *would* increase the awareness? Nothing is too crazy.

That is, until the comparison phase starts. Narrow the ideas down to ones that can be built and fit in the scope, as well as any other requirements that came up during the literature research.

Then, these ideas will be compiled into a survey and sent directly to the target audience. What appeals to them? What about this idea or that interests them?

Combining the results of the survey as well as the comparison will create one, or perhaps several ideas worth prototyping – which will then move on to the next sub-question.

Note. Images from CMD Methods Pack, by K. van Turnhout.

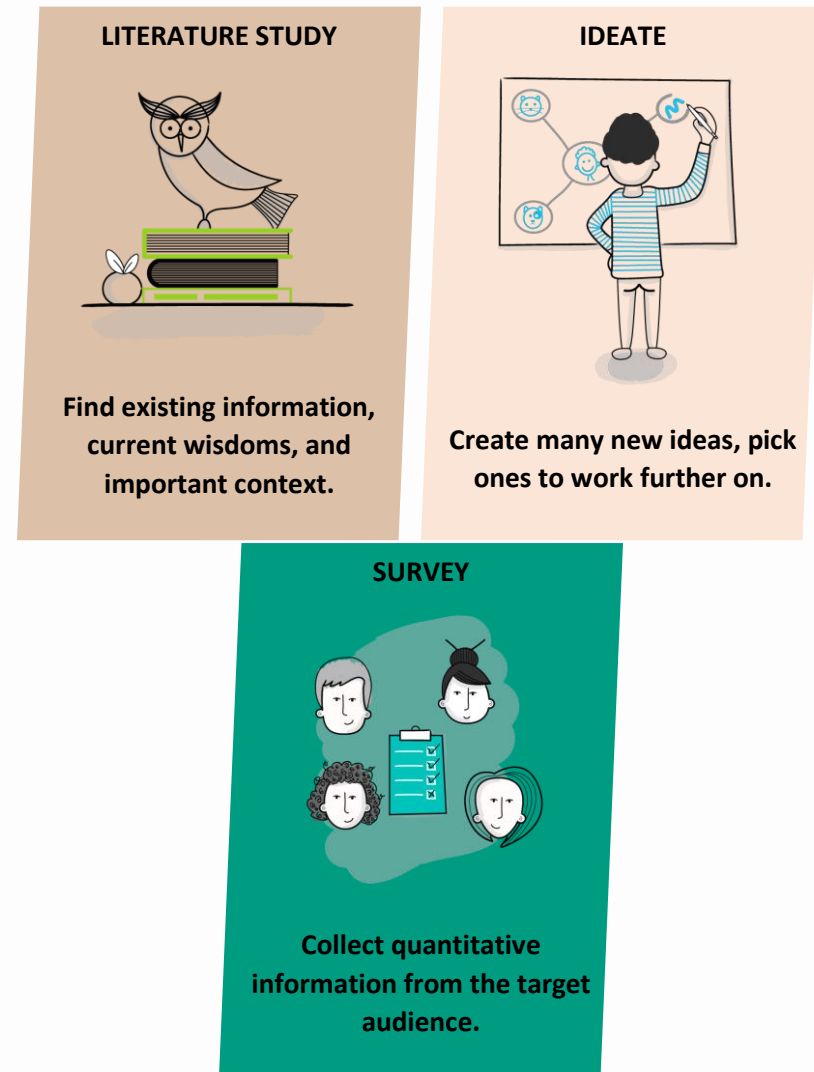


Figure 3 Short explanations & images for the literature study, ideate & survey methods

3.5.2. What is the design of said platform and its interactivity?

This question will start with the creation of a prototype based on the results of the previous question. Figuring out what functionality from the chosen idea is important for future testing and creating said functionality.

Afterwards, a usability test will be crafted to test the prototype and see how the target audience feels about it & what its issues are. The results of this usability test will then be compiled, and improvements will be made.

3.5.3. What are the technical requirements of the platform?

This question will be focused on providing future developers with the technical design of the prototype. The technical aspects can be divided into three sub-questions:

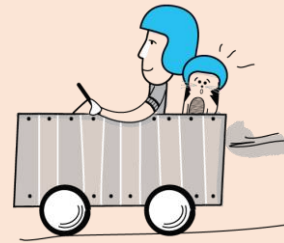
- How will the interactive platform be distributed? Mobile app, website.
- What tools will be used to create the platform? Technical tooling for the foundation of the platform.
- How will the platform be hosted? What kind of server set-up will the DSFW need?

All three questions will be answered in similar ways: Gather information on the options, create proof of concepts where applicable and then create comparison and lists to find out the best options for the DSFW and any future developers.

The goal is not to find a singular answer (Though it can be) but rather a range of options for future developers to pick from, depending on the needs of the project then.

Note. Images from CMD Methods Pack, by K. van Turnhout.

PROTOTYPE



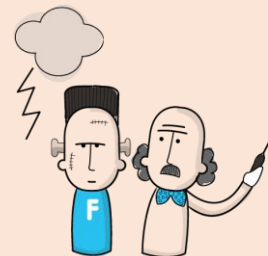
Develop ideas into usable and interactable prototypes.

USABILITY TEST



Let users use prototypes and find out users' feelings and issues with the design.

PROOF OF CONCEPTS



Create small showcases for usability or feasibility of an idea.

COMPARISON

	X	✓	✓
	✓	X	✓
	X	✓	X

Compare attributes of existing tools to find out the best ones for the project.

Figure 4 Short explanations & images for the prototype, usability test, proof of concepts & comparison methods

4. SUB-QUESTION ONE

What kind of platform would reach teenagers

4.1. Ideate

As mentioned in the initial research, the DSFW has the following ways to reach any audience:

- Participating stores, specifically smaller things like posters
- Social media:
 - TikTok
 - Instagram
 - Facebook (Not preferred, due to comparatively smaller presence)
- The DSFW website
- Industry contacts (such as participating stores)

As also mentioned, teenage presence & interest in both stores and events is even smaller. There is also no real advertising budget. This already practically leaves social media as the only option.

Now, in research by Joyce & Nielson (2019) teens are shown to be more impatient, show a lack of research skills and have lower reading levels. They surf the web with the following goals:

- School assignments
- Hobbies and other interests
- Entertainment
- News
- New topics
- Connecting with friends & family
- Shopping

The research also mentions three reasons why teens perform worse than it comes to browsing the web and researching online: Teen tackle problems with confidence, but they give up quickly due to their *lower levels of patience*, in addition 'fast moving teens' are less cautious and form opinions with less justification, not bothering to do enough research or read deep enough into the text due to their lower reading levels.

Thus, the product will be designed for users who want information in short, bite-sized formats. Walls of text will not be read, and the important info should be at the very front. The following principles are mentioned as having success:

- Display small chunks of content which is meaningful with a lot of white space
- Make use of words that are understandable for them without a condescending tone
- Short sentences and paragraphs
- Use bullet points
- Have larger fonts
- Don't make use of unnecessary interactive features
- Show them something new and keep them focused on a goal

- Fast loading times
- Avoid mandatory registration
- Have them in control what and how they share it
- “Copy link options” for direct message sharing
- Design with mobile viewing in mind

Finally, interactive features are mentioned to do very well. These could include:

- Quizzes
- Feedback or asking questions
- Voting
- Games
- Sharing pictures
- Editing content

With this knowledge in mind, both team members created ideas and then presented them to each other, as well as building upon each other’s ideas. Afterwards, a mind-map (Figure 5) was created to display the ideas. The following ideas came out of the brainstorm:

Table 2 Results of the brainstorm

Idea	Description
Chatbot	A website hosting a chatbot that answers questions regarding sustainable fashion, fast fashion, and what actions they can take.
Quiz for education	A quiz that can be used in classrooms by teachers to test the knowledge of students. Different cards showing interesting facts about fast- and sustainable fashion are also available for print.
List of sustainable clothing stores	A website that displays information about sustainable clothing stores and brands, what makes them special and why it matters to buy sustainable fashion.
Secondhand tracker	A website that shows secondhand shop and events that are happening close by as well as local groups from social media platforms like Facebook.
Label Scanner	Users can visit a website that allows them to take pictures of their garments label to see interesting information about the product. In the end it rates their clothes with a score, this can be shared on social media.
Textile Story	User can visit a website to see the lifecycle of their garment and play through it by making choices in a dialog screen.

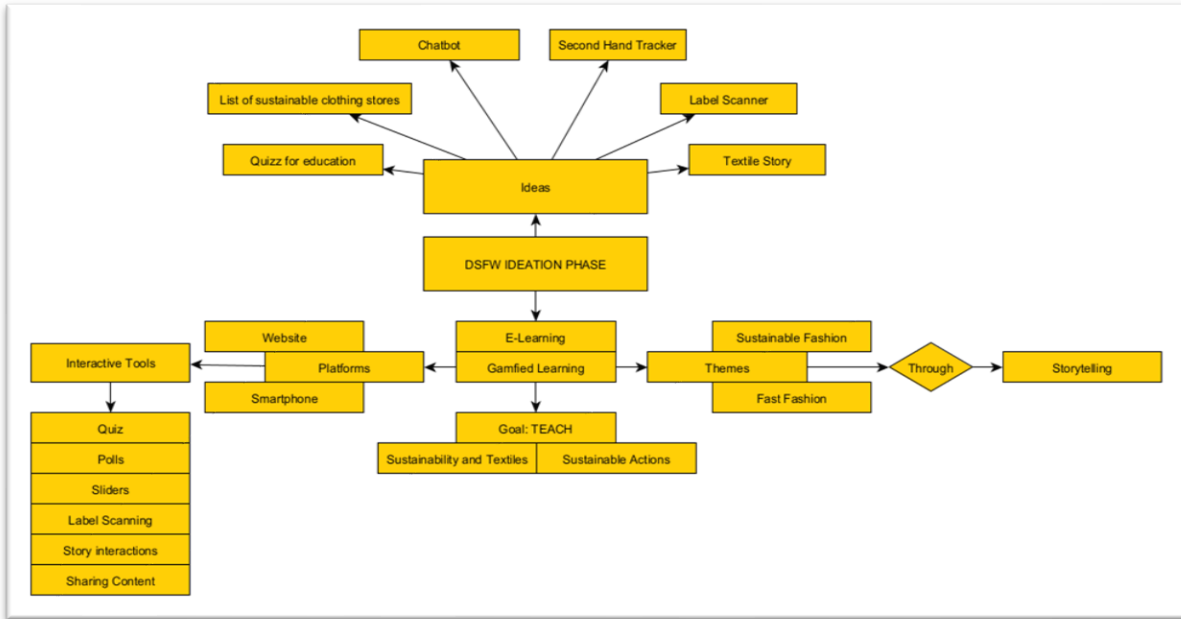


Figure 5 Mind map of the ideate phase, made by Sebastian Surwehme

These ideas were first evaluated according to the scope, and then according to a survey. Finally, they were judged based on both. The scope can be found in Table 2 below, compiled by Sebastian.

Table 3 Evaluation of brainstorm ideas, made by Sebastian Surwehme

Legend: ✓ Fulfilled ✗ Not Fulfilled 🖐 Somewhat fulfilled ? Unclear 🎯 Possible

		Chatbot	List of sustainable clothing stores	Quiz for education	Secondhand Tracker	Label Scanner	Textile Story
Must Have	Thoroughly tested UI	?	?	?	?	?	?
	Interactive Elements	✓	🖐	✓	🖐	✓	✓
	Gamification Elements	✗	✗	✓	✗	✗	✓
	Information is correct	🎯	🎯	🎯	🎯	🎯	🎯
	Educative	✓	🖐	✓	🖐	✓	✓
	Easy to share	🎯	🎯	🎯	🎯	🎯	🎯
	Engaging towards the target audience	✗	🖐	✗	✓	✓	✓

	Technical Recs	🎯	🎯	🎯	🎯	🎯	🎯
	Tested	🎯	🎯	🎯	🎯	🎯	🎯
Should have	Similar visual identity as the DSFW	🎯	🎯	🎯	🎯	🎯	🎯
	Emotional Storytelling	✖	✖	✖	✖	✖	✓
	Feasibility Prototypes	🎯	🎯	🎯	🎯	?	🎯
	Clean Code	🎯	🎯	🎯	🎯	🎯	🎯
Could have	2D animation	✖	✖	🎯	✖	✖	🎯
	Design with disability in mind	🎯	🎯	🎯	🎯	🎯	🎯
	Sound & Music	👤	✖	👤	✖	👤	👤
	Different Languages	🎯	🎯	🎯	🎯	🎯	🎯
Won't have	3D	✓	✓	✓	✓	✓	✓
	Virtual Reality	✓	✓	✓	✓	✓	✓
	Advertisement	✓	✓	✓	✓	✓	✓

4.2. Survey

These six ideas were then tested via a simple survey. Coincidentally, color schemes were also tested in this survey, but it later turned out that the DSFW was already very set on the color scheme, thus the color scheme will be included in the results in the appendix, but not mentioned here.

4.2.1. Goals of the ideas:

- The ideas are fun
- The user wants to use the ideas
- The user's awareness increases

4.2.2 Main goals of the testing:

- User ideas are collected
- User opinion on the ideas is collected
- User opinion on the color schemes is collected

4.2.3. Questions:

1 2 3 4 5

Hoe leuk vind jij dit idee? 1 = niet leuk, 5 = heel erg leuk.

Hoe nuttig vind jij dit idee? 1 = niet nuttig, 5 = heel erg nuttig.

Hoe uniek vind jij dit idee? 1 = niet uniek, 5 = compleet uniek.

Zou jij dit gebruiken?

Ja

Nee

Anders:

Figure 6 Mobile screenshot of the survey questions in Dutch

First, two demographics questions: Age & do they buy their own clothes?

Then, a series of questions about color schemes. These questions or their results are no longer relevant, however, as the DSFW decided after the survey was sent out that any prototype had to match the color scheme of the DSFW.

The main goals of the survey were to figure out user preference & interest in each idea. Which ones do they think are fun? Which ones would they use? Thus, users presented with simple sketches of each idea and a short description, then asked four questions per prototype:

Three questions on a 5-point scale with points as following: 1: Not at all & 5: Very much

1. How much do you enjoy the idea?
2. How useful do you think the idea is?
3. How unique do you think the idea is?

Finally, the last question was a simple yes/no question:

4. Would you use this?

The survey was distributed via friends & family, with the question if they could send it onwards to anyone else who they might know in the target audience.

The full results can be found in appendix B, but the important results are in Table 4.

Table 4 Idea survey results

Results	Chatbot	List of sustainable clothing stores	Quiz for education	Secondhand Tracker	Label Scanner	Textile Story
Enjoyment Average(Mean)	2.39	2.74	2.48	2.93	3.30	2.67
Usefulness Average(Mean)	2.59	2.76	2.60	2.98	3.39	2.48
Unique Average(Mean)	2.59	2.71	2.74	2.67	3.25	3.00
Would you use this? Percentage Yes	30%	38%	18%	41%	57%	43%

4.3. Conclusion

4.3.1. Survey Conclusion

Based on the results in table 4, there was one clear 'winner': The label scanner.

Ranking the results on interest in using gives the following order:

1. Label Scanner (57%)
2. Textile Story (43%)
3. Secondhand Tracker (41%)
4. Sustainable Store List (38%)
5. Chatbot (30%)
6. Quiz (18%)

The label scanner being such a clear winner, however, presented an issue: As mentioned in 4.1, teenagers are not interested in massive walls of text: It would be very hard to convey not only the information about their clothing, but also what they could improve after scanning a label. So, what about the other results?

Starting from the bottom, the quiz is amongst the lowest in every single score, only scoring middle of the pack in uniqueness. It can safely be scrapped. The same goes for the chatbot, the actual lowest in both enjoyment and uniqueness, this is also an easy scrap. Finally, the sustainable store list: it already exists in a variety of forms. If people want this, they are already using it.

That leaves the textile story and the secondhand tracker to take inspiration from.

4.3.2. Question conclusion

After looking at the ideas and talking about it with the client, two easy combinations came up with the label scanner. A collection app with the secondhand tracker, allowing users to scan the secondhand clothing they pick up and build a collection, as well as find new stores to pick up more secondhand clothing.

As for the textile journey, it once again comes naturally: Simply do the journey with the scanned label. Perhaps it can even have the original purpose, with a 'short' rating based on just the label, and then a more in-depth review and information in the journey afterwards, allowing for lots of learning opportunities yet a low-effort hook to get teens in.

These two ideas were then swotted and discussed, as seen in table 5.

Table 5 SWOT of the ideas

Label scanner + Secondhand tracker			
Strength:	Personalized to the user Relevant expansion for the DSFW website in the tracker Available on smartphone & PC Simple prototype	Weakness:	Manually updating to add locations Easily replaced by just searching on google

			No significant e-learning or gamification No storytelling No increase in awareness for users that aren't interested in sustainable fashion
Opportunity:	Expansion into multiple languages/areas Opportunity for more partnership with secondhand companies/events	Threat:	Label scanner is very complex to implement Does not reach users that aren't already interested in secondhand
Label scanner + Textile Story			
Strength:	Interactive User is in control Communication through images Expandable Easily shareable (Results) Storytelling Available on smartphone & PC E-learning & gamification	Weakness:	Relatively high amount of artwork Not much variation (Much overlap between different textiles) Weak incentive to replay
Opportunity:	Expansion into multiple languages Usable in education for the target audience First of its kind	Threat:	Label scanner is very complex to implement Quality of artwork could suffer under amount

Based on this & the talks with the client, the team has decided to develop the label scanner + textile journey prototype further. The reason for this is that the main struggle is reaching a new target audience: The secondhand tracker will struggle with that and be harder to spread than the textile journey, due to the difference in shareability between the two.

5. SUB-QUESTION TWO

What is the design of said platform and its interactivity?

5.1. The first prototype

5.1.1. Decisions

The prototype was split into two, with Sebastian primarily working on the journey and Rick on the label scanner. This was done because the textile journey is the art-heavy one and Sebastian could do the actual journeys quite well via Adobe XD, and the label scanner and figuring out how that would work is more technical, hence the division.

The first step was to investigate how one would make an actual label scanner, the results of this can be found in chapter 6.2. But the primary finding that's important right now is that it would take a long time to build a label scanner and could be a project on its own. Thus, the decision was made to make a fake prototype first to see if the label scanner would resonate with teenagers and to test the actual idea.

5.1.2. Creation

The main thing that is important is people's reaction to the label scanner as well as their overall reaction to the idea: Would they want to use a finished, real version of this? Thus, a simple linear prototype was made. Users would go through a series of screen, scanning a pre-selected photo and then getting the result of said photo.

The look was chosen to primarily fit in with the DSW style, with the background color taken from an earlier quiz app by the DSW (DSFW, 2020) and the UI elements themselves designed by Sebastian Surwehme. Finally, the prototype was made with the base React web framework & the React-Router package.

The full reasoning for this will be explained in chapter 6.2, but the short of it is that React allows for quick and smooth development as well as easy deployment for testing & React-Router is a package for React which allows for the creation of full websites that require no reloading, making it feel more like an app. Redux, which is another package that will be recommended in 6.2 was skipped: This is for managing lots of variables efficiently, such as managing all the different choices made in a journey. Since the label scanner on its own only really has the scanned label to store, there was no need for this in the prototype.

As for the labels itself, from a conversation with Linn, A. (2022, April 15) volunteer contact at the DSW and a garment expert, the information the label contains was gathered. It contains two primary pieces of information: The material & the country the garment was manufactured in. The country here says nothing about the material, as according to Linn the material is often gathered in different countries. It does however say things about workers' rights, such as wages and overtime, as well as treatment of hazardous materials.

The material itself has multiple general implications (Harmful chemicals used in manufacturing, water usage, fossil fuel usage and more), though one key factor is missing: Recycling. This alone can turn a

polyester garment from something extremely harmful to the environment to arguably beneficial. Thus, after the scanner a manual question would need to be added to check if the garment had a recycled tag.

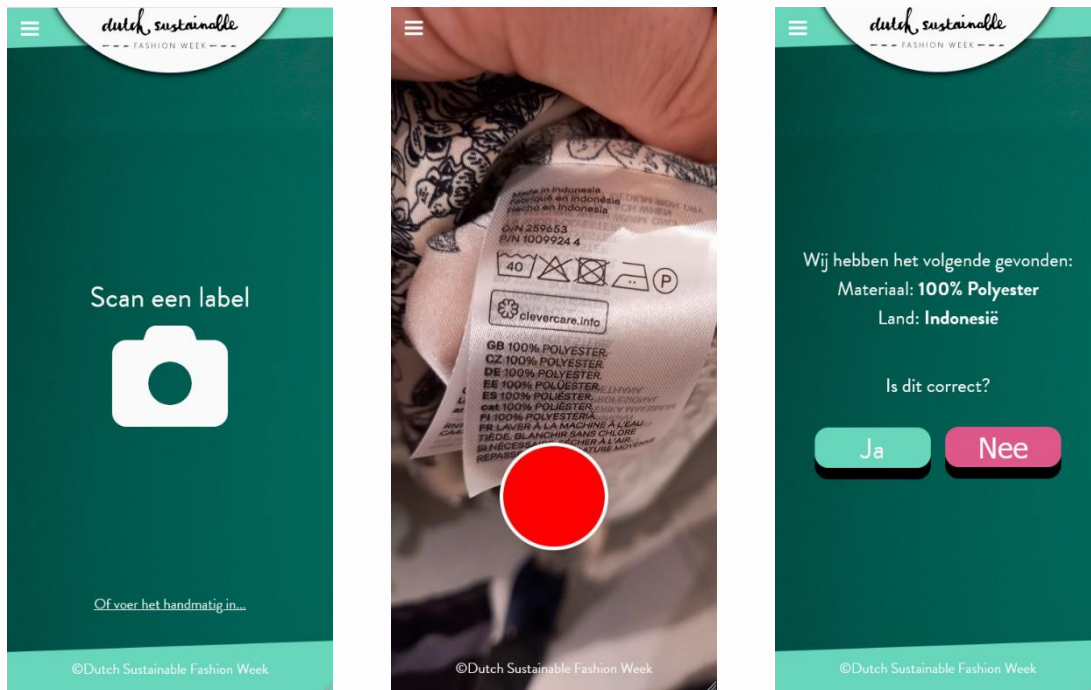


Figure 7 Three screenshots of the label scanner website.

The choice for the pre-scanned label was a polyester label from Indonesia, polyester carries plenty of interesting implications with it, such as mentioned in 2.4.2 and Indonesia has lots of issues with workers' rights, according to a paper by Fair Wear (2019). Overall, this combination has lots of interesting information to tell the users and hopefully trigger them to want to read more.

Finally, although the journey prototype was made by Sebastian, Rick translated all text from English to Dutch.

5.2. Test

The test was done with 4 classes on May 9th, 2022, at a high school in Amsterdam Noord. All classes were the Dutch high school level Havo and in their 4th year, meaning that the general age range would be about 15-17.

The first two classes were done with Rick present, and the latter two with just the teacher, Anne-Linde, who also assisted with setting up the test as well as the first two classes.

Although the original plan was to test individually, one by one – to be able to record the full test and gauge their reaction, this turned out not to be possible due to restrictions at the school. This meant the test had to be designed to be done all at once with a group of about 20 students, and it would have to be voluntary. The test itself was split in two, with a label scanner section & a journey section as the two prototypes were separate and would have different issues. Most of the questions were the same, with a few individual ones. The test set-up was as follows:

5.2.1. Goals of the prototype:

- The prototype is enjoyable
- The user's awareness increases

5.2.2 Main goals of the testing:

- Flaws/bugs are discovered
- User ideas are collected
- Users' opinions on the prototypes are collected

5.2.3 During the session:

- Walk around and watch users navigate through the UI
- Take notes of observations & issues
- Answer questions during the testing sessions, note down the questions and if they repeat
- Make sure to help, but do not do it for them – make sure to check where they get stuck
- Record time for how long it takes to fill in the prototypes

5.2.4. Sequence of the testing:

1. Inform the users about the test:

The goal of the testing

The voluntary nature

The limitations of the prototype

Explaining the sequence of the testing

2. Get demography info via Qualtrics

Age, do they buy their own clothing & how do they feel about the environment?

3. Users do first prototype

Users go through the label scanner prototype, scanning the pre-supplied label

Users go back to the Qualtrics and answer questions about their experience with the prototype

Tester walks around the room & answers questions, gauges reactions and takes note

4. Users do second prototype

Users go through the journey prototype, going through one full journey

Users go back to the Qualtrics and answer questions about their experience with the prototype

Tester walks around the room & answers questions, gauges reactions and takes note

5. Insight evaluated

Collected data will be weighed, invalid data thrown out and explained why

Understanding the “why” behind aspects not meeting the standards

Plans for upcoming changes are planned and evaluated with the client

5.2.5. Questions:

Table 6 Questions and how they were made, format made by Sebastian, final set of questions by Rick in collaboration with Sebastian

Legend	Demographics Questions	Mutual Questions	Label Scanner Question	Journey Questions
Aspect (What do you need to know)	Indicators	Question(s)		
They hold their phone horizontally or vertically	Use Qualtrics data to scan how they held their phone when they opened the survey	Qualtrics Browser Info		
User is within the age range		How old are you?		
User buys their own clothing		Do you buy your own clothing?		
The environment is important to user		Rate the following statements: <ul style="list-style-type: none"> - The environment is important in my life - Choices I make influence the environment - The environment influences my choices 		
The prototype was working	Users were able to finish the prototype	Did you finish the prototype? If not, why not?		
The time it takes to finish the prototype is good	Users finish the prototype User opinion about the length of the prototype is positive User did not start seeking distractions during the testing	How long did you take to finish the prototype? What do you think of the length of the prototype?		
The experience of the prototype was good	User opinion is positive User would want to use the finished version	Did you enjoy the prototype? Would you want to use the finished version?		
The prototype had good aspects that should be built upon	User shows positive emotions whilst playing User talks about section with friends	What did you enjoy about the prototype?		
The prototype has bad aspects that should be iterated upon	User shows frustration & negative emotions whilst playing User talks about section with friends User complains to tester	What did you not enjoy about the prototype?		

The prototype is easy to look at	The user opinion on the look and feel is positive The user finds the prototype professional	1-5 Scale question from not to very: What do you think about the look of the prototype? Pretty: Professional:
The prototype is easy to navigate through	The user has no problems with navigating to the different screens The user is not stuck on one part of the prototype	Did you have any issues with navigating through the prototype?
The prototype is used in a certain environment	The user indicates what types of environments they would use this in (Stores, own clothing, friends)	What kind of clothing would you want to use the prototype with? Pick what is relevant <ul style="list-style-type: none"> - Clothing in a store - My own clothing - My friends clothing
The prototype increases the knowledge	User knows more about textiles or the fashion industry User now knows methods they did not know before on how to improve their own behaviors	Did you learn anything new about polyester or the clothing industry in the prototype?
Will the prototype only be used once, or will people replay it	User wants to try out the different routes User wants to play the finished version	Would you play it again to find different routes? Would you play the finished version?

The questions were afterwards translated into Dutch and can be found in the appendix.

5.2.6. Results

Question	Result
Choices I make influence the environment	1-5 Scale: 2.89 (Mean)
Journey: Fun	68% had fun.
Journey: Use finished	25% would use the finished version.
Label scanner: Fun	39% had fun.
Label scanner: Used finished.	32% would use the finished version.

The test was done on a voluntary basis with 52 students participating in total. However, either due to boredom or otherwise, many students filled in fake information. After filtering out students who filled in times that were not correct as the longest person on site took twenty minutes as well as anyone who filled in swear words or just gibberish, as well as students who did not buy their own clothes, there are 28 real responses.

There was a very low interest in the environment across the group, with the majority not considering the environment in their choices or believing they can do much to affect it.

For the prototype results, the journey was well liked and had good results. Though few wanted to use the finished version. More can be read about that in Sebastian's paper. The label scanner, however, was generally disliked in the survey. People did not enjoy using it, did not want to use it again and just generally had lots of disappointment with the prototype as well as issues and confusion around the pre-selected image in the scanner.

This is backed up by the observations, where the moment people opened the label scanner prototype, they started grabbing random clothing articles from their bags, asking friends to take pictures of the labels of their clothes and more – only to then be confused at the scanner already having an image in it and not allowing them to select their own.

5.2.7. Test Conclusion

The results show more testing will be needed; the label scanner was a huge flop but there are a multitude of factors to explain why:

- The testing group had a low interest in the environment or their influence on it, a group with a higher score there would want to use it more.
- There was much excitement about the label scanner at first, which only made the disappointment of not being able to scan their own clothing hit harder. It would be good to test again with a prototype version where they can scan their own clothing.
- There were also UI issues and bugs with the label scanner, a version where possible user actions are better explained could alleviate these issues as well.

Overall, more testing will be needed, and a better label scanner prototype will need to be developed to confirm whether the results are correct or not.

5.2. Conclusion

A second prototype has been started but not finished. However, this is to test the idea further without needing to develop an OCR still. The designed method is to have the label scanner as it is now, a server & a second 'OCR' website.

Users open the label scanner and take an image. The scanner then uploads this image to the server, this sends a notification (Via WebSocket) to the second website, which will then get the image and display it. From here, the tester can then manually select the material & country on the label which sends it back to the server and then the label scanner, providing a real OCR without needing to develop one.

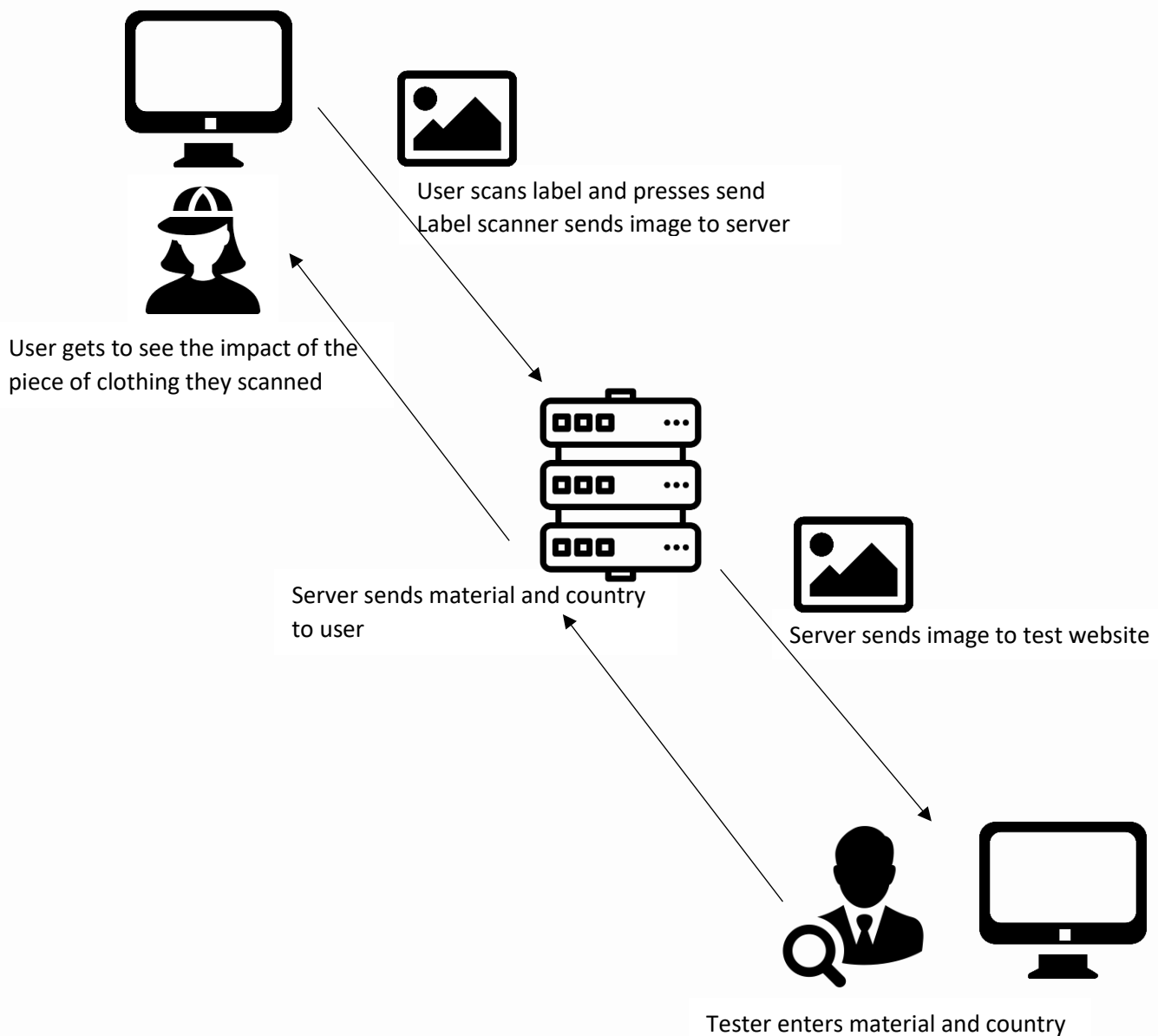


Figure 8 A simple diagram of an updated label scanner prototype

6. SUB-QUESTION THREE

What are the **technical requirements** of the platform?

6.1. How will it be distributed?

As mentioned in 2.3. most teenagers are on mobile phones, and specifically on social media. As mentioned before in chapter 2.2, the DSFW has access to the following ways of spreading anything to teenagers:

- TikTok
- Instagram
- Facebook
- Their website
- Industry contacts, for posters in stores and venues during the week

As they also have a low budget, anything like influencers or store spread will be volunteer-driven. This means it should be as easily shareable as possible. This leads to the logical conclusion of creating something that can be easily shared via a link.

The DSFW will be able to generate an easily shareable QR code for posters, make a short URL for on their social media & website and much more for the most flexible distribution possible. This way, not only can they spread it on the platforms teens use such as TikTok or Instagram, or use influencers via this URL, they can also easily spread it anywhere else they want such as physical events.

QR Code: A website link (such as google.com) converted to an image

Figure 9 A short explanation of the term QR Code.

6.2. How will it be created?

Table 7 Comparison of a game engine, native apps & two web frameworks. Based on developer experience.

Framework	Website	App	Speed	Loading times
Unity	Possible	Possible	Fast	Slow
App (Android/iOS native)	Not possible	Possible	Very fast	Fast
React	Possible	Possible	Fast	Fast
Vue	Possible	Possible	Fast	Fast

Although there is an endless way of creating a platform like this, as new frameworks, engines and more come out every month – this comparison serves to compare a game engine, a native app and two web frameworks. They are all valid choices, however, one has to be best.

As demonstrated in table 7, that choice falls to web frameworks. Both in developer experience and flexibility. It would mean easy access on any device unlike apps and low loading times unlike a game engine. As mentioned in 4.1, teens lack patience in their internet usage.

The chosen web framework is React, mostly because of developer experience. However, any web framework would be valid. Simply go with the one that the developers find easiest to work with, it really does not matter.

This is combined with React-Router to allow linking to pages for easier testing, whilst still having the experience be smooth like a web app. Finally, for a real project a recommendation would be for a

Game Engine: A pre-made set of tools to make games with, allowing developers to skip basics like getting input or physics.

Unity: A popular game engine, allows for creating games for a variety of devices, including both apps and websites.

App framework: A framework for developing mobile apps, usually focused on either Android or iOS.

Web framework: A framework for developing websites. Usually have some kind of plug-in available to convert them to apps.

Figure 10 A series of short explanations on various technical terms.

package like Redux, so that the large state that comes with having so many choices can be efficiently managed.

There is one special case for the development of the platform, however, and that is the XD prototype. For any future developers, it would obviously be nice to re-use existing work. That is rather easy for the app prototype, just keep writing code. But what about the XD prototype?

There's essentially a spectrum of options, on one end is completely re-doing the prototype from scratch to ensure the JavaScript & CSS is up to scratch. On the other end, there are conversion programs to turn the XD file into code – fix up the code and the XD prototype is a fully working app.

The catch? The auto-generated code. Seen in figure 12 is a piece of CSS, the styling of the prototype. It contains the selector for the ID Group_4_br, meaning that this selector is unique. The same goes for Rectangle_38_bs. There is however, also, a Rectangle_38_bw, and a rectangle_85_bw, and forty other results for Rectangle_.

There are a few issues with the prototype by default already, the main one being that it must be ran using a normal web sever and every 'screen' is a new HTML page. This means that there are loading times between each screen, and end/start animations tend to not play. These are issues that could be fixed, for example, with React-Router mentioned earlier.

However, the question for any developer team tackling this is whether it is worth it to fix these massive issues, or whether it is simply too much of a hassle. Still, the generated code provides a nice cheat sheet for any recreation, with the exact CSS available.

Package: A 'plug-in' for web frameworks, to expand its capabilities. Such as allowing it to become an app.

React/Vue/Redux: A pre-made set of tools to make games with, allowing developers to skip basics like getting input or physics.

Adobe XD: A program for fast prototyping, allowing a developer to create screens and then link up those screens to test interactivity.

JavaScript: A programming language popular due to it being able to run in browsers.

CSS: A scripting language that allows for easy styling of elements on websites.

Figure 11 A series of short explanations on various technical terms.

```
#Group_4_br {
  position: absolute;
  width: 207px;
  height: 600.372px;
  left: 249px;
  top: 257px;
  overflow: visible;
}
#Rectangle_38_bs {
  fill: rgba(255,255,255,1);
  stroke: rgba(112,112,112,1);
  stroke-width: 1px;
  stroke-linejoin: miter;
  stroke-linecap: butt;
  stroke-miterlimit: 4;
  shape-rendering: auto;
}
```

Figure 12 A slice of code from a generated Adobe XD file.

This leaves the last part of the platform: The OCR. There are once again two ways to tackle this, though this time there is a bit more clearly defined nuance.

1. Self-made OCR: Using machine learning to create an OCR system based solely on images of labels. Most likely to have good accuracy, lots of work, however – only advisable if the other options are not good enough.
2. Self-ran OCR server: Use a pre-made OCR like Microsoft's, or Google's and set it up on a self-hosted VPS. Will likely be less accurate, but also the most cost-efficient.
1. Cloud-OCR: AWS, Azure & Google, all have cloud-based OCR services, skipping much of the complex VPS set-up and allowing a simpler server to connect to the cloud-based OCR. Potential for easier tuning, as well as more scalable costs. Pay for what's used only.

To drive home the points above, a demonstration is in order. In figure 14 and figure 15, two labels can be found that were taken in the Hema, a Dutch retail chain. In table 8, on page 31, the results of the built-in OCR on windows, the built-in OCR on android & the google cloud OCR can be seen.

What might not be immediately clear is that almost all the necessary information CAN be gathered from these results. All of them correctly get the materials, android & google even got the country in figure 15, despite it being extremely blurry and folded in the corner of the image.

A self-made OCR will, however, be far more accurate – yet also more work. It is up to the developer to decide whether these results are good enough, or not. More tests can always be done when deciding exactly which OCR to go with.

OCR: Optical Character Recognition. Being able to read text from images.

VPS: Virtual Private Server. A blank server where everything is set-up by the user.

Cloud: Big servers where users rent only part of the server for a service it provides, usually runs on a pay for what's used model.

Figure 13 A series of short explanations on various technical terms.

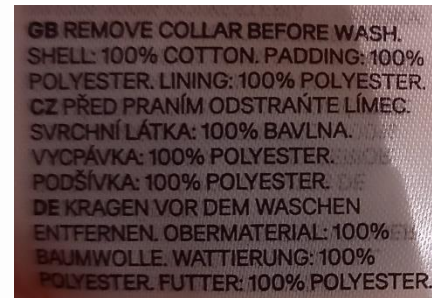


Figure 14 A label for a piece of clothing. It reads: Shell: 100% cotton. Padding: 100% polyester. Lining: 100% Polyester in three languages.

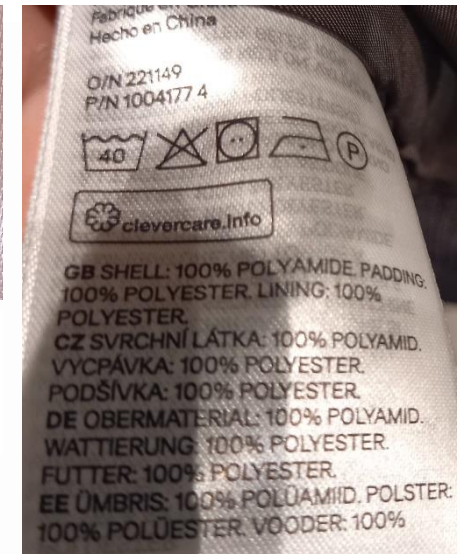


Figure 15 A label for a piece of clothing. It reads: Shell: 100% Polyamide. Padding: 100% Polyester. Lining: 100% Polyester. in four languages.

Table 8 A table showing the results of pre-set OCR on figure 14 & figure 15.

Label	Windows built-in	Android built-in	Google cloud
Figure 14	GBREMOVE COUARBEFOREW \$ POLYESTER POLYESTER CZ PRAN(M ODSTRANTPIÅM VYCPÅVKA• 100% POLYESTER 'fig nDSfVKA' 100% DEM WASCHEN ENTFERNEu Fm- YSTERFUTTENNOO%IPOLYESTEZE	GB REMOVE COLLAR BEFORE WASHJ SHELL 100% COTTON. POLYESTER. LINING: 'OO% POLYESTER. CZ pkED PRAN(M ODSTRANTE SVRCHN(LÅTKA: 100% BAVLNA. VYCPÅVKA• 100% POLYESTER. PODSfVKA• 100% POLYESTER DE KRAGEN VOR DEM WASCHEN ENTFERNEu OBERMATERIAL•nOOO/O B4JMWOLLE. WATTIERUNGMOOO/O POLYESTER FUTTER 100% POLYESTER.	GB REMOVE COLLAR BEFORE WASH. SHELL 100% COTTON. POLYESTER. POLYESTER. CZ pkED PRAN(M ODSTRANTE SVRCHN(LÅTKA: 100% BAVLNA. VYCPÅVKA• 100% POLYESTER. PODSfVKA• 100% POLYESTER DE KRAGEN VOR DEM WASCHEN ENTFERNEt.1 OBERMATERIAL•A000/O æUMWOLLE. WATTIERUNG:MOOO/O POLYESTER FUTTER'
Figure 15	crop: b/N221149 1004177 4 Ocldvorcara.Info GB SHELL: 100% POLYAMIDE 100% POLYESTER LINING: 100% POLYESTER CZ SVRCHNI 100% POLYAMID. VYCPÅVKA• 100% POLYESTER PODS(VKA 100% POLYESTER DE OBERMATEREAI: POLYAMiD. WATTIERUNG» 100% POLYESTER. EE OMBR!S IQO%POLÜAWD. POLSTER 100% POLOESiER VOOD*	r.ø•MiG en China OIN22t149 GB SHELL: 100% POLYAMIDE 100% POLYESTER LINING: 100% POLYESTER CZ SVRCHNfLÅTKA: 100%	Hech0 en Chlna o/N22t149 1004177 4 Ocldvorearo,Info GB SHELL: 100% POLYAMIDE 100% POLYESTER LINING: 100% POLYESTER CZ

6.3. How will it be hosted?

The reason for cloud-based OCR not being advised is simple: Budget. In the case of the service getting far too many users, a cloud-based OCR will shut down altogether, as the budget is exceeded, with the danger of incurring a huge bill that cannot be paid after. A VPS will continue to function, if at limited capacity, and will not incur any extra costs either.

The server itself is set-up via NodeJS for quick development, but depending on the framework used, any C++, Go, or other platform would be better for a final product. The best way to host it is simply via a VPS, so all the set-up can be done by the developers and an optimal configuration can be reached.

Cloud: On cloud servers, users generally set a budget cap: Once the user exceeds that budget in their cloud services, they shut off completely. Though sometimes after the charge has already happened.

VPS: On a VPS, a server might go down under extremely heavy load, but it will never incur extra charges, simply slow down.

6.4. Conclusion

In conclusion, budget will be key. Careful discussion with the DSFW and their capabilities should be discussed, including the potential of long-term support. A system designed to function without maintenance from the original developer will need a lot more care and attention.

Still, support for each possible choice is there – it will simply depend on the developer to decide what option to go with.

7. CONCLUSION

The label scanner was the most well-liked idea in the original survey by a landslide, with 57% wanting to use it. Compared to the textile journey, which was at 43%, it should have been most popular part of the prototypes. Taking it into testing lead to an almost opposite effect, however, with many in the target audience disliking it – it was the least popular prototype of the two.

Due to all the confusion around the first prototype, however, another test is needed with a better, clearer prototype. Can that original enthusiasm from the survey be captured in a prototype? This question is still open, but initial impressions suggest that with a better focus on the novelty of the prototype, the answer will be yes.

Finally, the technical requirements of the platform are quite hefty. A future developer will have many choices ahead of them, some of the way has already been paved by the current prototypes, but work will need to be done to ensure that the current prototypes function as good web apps.

That brings the main question.

How to create an interactive platform that increases the awareness of teenagers that buy their own clothes about sustainable clothing and textiles?

It all depends on further testing. Awareness was increased, but will it interest teenagers? Although testing will be needed, observations during the prototyping did show initial enthusiasm for the label scanner before it was soured. Assuming the label scanner is further developed in the right direction, it *should* manage to grab the attention of teenagers.

8. DISCUSSION

8.1. Results

As the results are spread over four questions, each of them will be addressed one by one:

8.1.1. Initial Research

The initial research matches exactly what the student paper said, as was expected and has been verified by the expert contact at the DSFW. That said, more outside sources could have been used on the current state of sustainable fashion. It is essentially a paraphrase of one documentary, then approved by the DSFW. It would have been better to look at the sources the documentary used.

8.1.2. Sub-question 1

There is one notable thing about the first survey and its results, there was a lot of enthusiasm for it. Perhaps letting it organically spread meant that it would only spread via those who were enthusiastic about it. Either way, the results were as expected, with the idea that was expected to come out on top making it out on top, and the idea that was least liked also being least liked by the users. As the next question shows, however, drastically different results might be expected depending on the method of spreading the survey.

8.1.3. Sub-question 2

The prototype testing has some major flaws, such as only being one specific school in Amsterdam and issues with the prototype itself. The previous survey might have turned out a lot differently if it had been taken at this one school. In hindsight, however, the results of the actual prototype testing were not hard to predict, with the prototype itself having many issues.

Still, testing with an audience that cares about the environment would have been better.

8.2.4. Sub-question 3

There is not a lot to talk about the technical analysis. Sufficient options were considered and chosen within the constraints of the project, such as the budget of the DSFW & the expertise of the developers

8.2. Limitations

The main limitation are the test audiences. Both the survey being spread organically, and only using one school. The survey means that it is impossible to know if the target audience is real, and only have good faith to go by.

Meanwhile the prototype testing would have been far more reliable if it had been done at multiple schools, especially for the journey. That said, the issues with the label scanner prototype might have very well given the same results there.



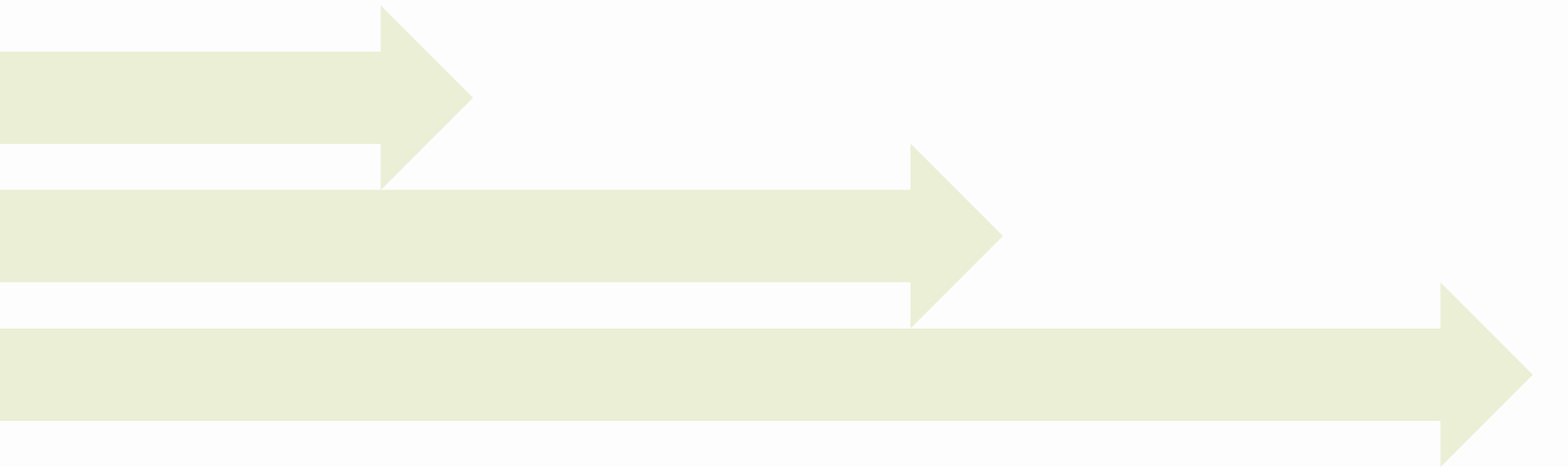
9. RECOMMENDATIONS

The project is not yet done. The first step would be to make sure the label scanner is interesting and relevant to the target audience, or if it should be dropped. The same goes for the journey to a lesser extent, there was enthusiasm for it, but it will still require a lot of work to create a platform like that. Creating accurate journeys for every material a scanner could pick up would be a massive amount of work, both in creation and simply in fact checking.

Overall, for both sides of the platform more testing will need to be done, with the Label Scanner taking priority with the bad results, better to know early if it should be dropped. It is also important to test with combining the potential prototypes, as that is still the eventual design goal and it should be tested if that works. For the label scanner, a field trial could be interesting, how interested are people in the label scanner when they get to just use it as they wish? This could be done either at schools again or with individuals, though it should be ensured that a variety of schools and levels are tested with. Perhaps individuals are better, to guarantee at least an interest in sustainable fashion.

The journey will need a big technical update to a proper web framework away from Adobe XD, as that is simply not viable and too slow for a real product – though it is possible to re-use the XD conversion, it will be better for the longevity of the code to start with remaking it from scratch. Finally in terms of development, the whole project needs art & polish.

How to achieve this? Putting it up as an IMT&S project at Saxion could be one way, or any other university with similar projects, that said, the OCR development could be a graduation project on its own if the developer does not have experience in it.



10. REFERENCES

- Batson, L., & Feinberg, S. (2015). Game Designs that Enhance Motivation and Learning for Teenagers. PSU.Edu. Retrieved 2021, from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.128.9391&rep=rep1&type=pdf>
- Beens, K., Gorter, L., Hullegie, R., Kruiper, M., Peters, C., & Vree Egberts, J. (2021). *Into the Future II* [Unpublished Project Report]. Saxion University of Applied Sciences.
- Bird, S., & Tapp, A. (2008). Social Marketing and the Meaning of Cool. *Social Marketing Quarterly*. <https://doi.org/10.1080/15245000801898399>
- Boykoff, M., Chandler, P., Church, P., & Osnes, B. (2021). Examining climate change and sustainable/fast fashion in the 21st century: 'Trash the Runway.' *Oxford Open Climate Change*, 1(1). <https://doi.org/10.1093/oxfclm/kgab003>
- California State University, Chico. (2010). *Evaluating Information – Applying the CRAAP Test*. Meriam Library. From <https://library.csuchico.edu/sites/default/files/craap-test.pdf>
- Cambridge Business English Dictionary. (N.D.). Social Marketing. In Cambridge Dictionary. Retrieved February 13, 2022, from <https://dictionary.cambridge.org/dictionary/english/social-marketing>
- Cohen, G., & van der Wijk, L. (2015, March 5). Duurzame Modeaankopen van Jongeren in Nederland. *Ministerie van Infrastructuur En Milieu*. <https://adoc.pub/duurzame-modeaankopen-van-jongeren-in-nederland-inzicht-in-h.html>
- Dutch Sustainable Fashion Week. (2020). DSFW. <http://dsfw.nl/>
- Fair Wear. (2019). Indonesia Country Study. Fair Wear Foundation. <https://api.fairwear.org/wp-content/uploads/2019/12/2019-Indonesia-Country-Study-.pdf>
- Fast fashion - The shady world of cheap clothing | DW Documentary. (2022, February 11). [Video]. YouTube. https://www.youtube.com/watch?v=YhPPP_w3kNo
- Goossensen, M. (2019, March). *Sustainable clothing consumption in The Netherlands*. <https://Edepot.Wur.Nl/504788>. Retrieved February 2022, from <https://edepot.wur.nl/504788>
- Joyce, A., & Nielsen, J. (2019, March 17). Teenager's UX: Designing for Teens. *NN Group*. <https://www.nngroup.com/articles/usability-of-websites-for-teenagers/>
- Kamphuis, A., Baart, L., & Roelofs, S. (2020, November 6). Jongeren & duurzame kleding. *CNV Internationaal*. <https://www.cnvinternationaal.nl/Resources/Persistent/f/e/c/2/fec24bcf5e686a55281968a16610f1456ece8bbf/CNVI-0262-Onderzoek-Jongeren-Duurzame-Kleding-CNV-Internationaal.pdf>
- Karl, S. (2020, April). *The Design Thinking Process – How does it work?* MAQE. <https://www.maqe.com/insight/the-design-thinking-process-how-does-it-work/>

- Knoll, J. (2015). Advertising in social media: a review of empirical evidence. *International Journal of Advertising*. <https://doi.org/10.1080/02650487.2015.1021898>
- Kostygina, G., Tran, H., Binns, S., Szczypka, G., Emery, S., Vallone, D., & Hair, E. (2020). Boosting Health Campaign Reach and Engagement Through Use of Social Media Influencers and Memes. *Social Media + Society*. <https://doi.org/10.1177/2056305120912475>
- MoSCoW Prioritization. (2021, September 11). ProductPlan. <https://www.productplan.com/glossary/moscow-prioritization/>
- Nibud. (2022) *Zakgeld en kledinggeld, hoeveel moet je geven?* From <https://www.nibud.nl/onderwerpen/kinderen-en-jongeren/zakgeld-en-kledinggeld/>
- Peattie, S. (2007). The Internet as a Medium for Communicating with Teenagers. *Social Marketing Quarterly*. <https://doi.org/10.1080/15245000701326343>
- Plattner, H. (N.D.). *An Introduction to Design Thinking*. Institute of Stanford Design. <https://web.stanford.edu/~mshanks/MichaelShanks/files/509554.pdf>
- Reutlingen University - Faculty of Textile & Design, Strähle, J., Will, C., & Freise, M. (2015, July). COMMUNICATION OF SUSTAINABILITY AT EUROPEAN FASHION ONLINE SHOPS. Reutlingen University. <https://publikationen.reutlingen-university.de/frontdoor/deliver/index/docId/224/file/224.pdf>
- Roeyen, P., & Maliadas, A. (2017). *White paper jongeren, merken en duurzaamheid*. Avans Hogeschool. https://hbo-kennisbank.nl/details/sharekit_av:oai:surfsharekit.nl:71a3e480-d3ca-4c59-ab4c-0a9bba1ac4a7
- Rogels, N. (2014). *Levensloopspsychologie* (5^e editie). Boom Lemma.
- Seo, H., Houston, J. B., Knight, L. A. T., Kennedy, E. J., & Inglish, A. B. (2013). Teens' social media use and collective action. *New Media & Society*. <https://doi.org/10.1177/1461444813495162>
- Siva, C. (2019, July). IMPACT OF ONLINE LEARNING ON TEENAGERS BUYING BEHAVIOUR. Researchgate. Retrieved February 2021, from <https://www.researchgate.net/publication/334430332>
[IMPACT OF ONLINE LEARNING ON TEENAGERS BUYING BEHAVIOUR](https://www.researchgate.net/publication/334430332)
- Tribelsi, I., & Benrached, K. S. (2010). Teenagers Reaction towards Mobile Advertising: Role of "Permission Marketing" concept. *IBIMA Business Review*. https://www.researchgate.net/publication/349031567_Teenagers_Reaction_towards_Mobile_Advertising_Role_of_Permission_Marketing_concept
- Vesselinov, R., & Grego, J. (2012). Duolingo Effectiveness Study. https://static.duolingo.com/S3/DuolingoReport_Final.Pdf. Retrieved February 2021, from https://static.duolingo.com/s3/DuolingoReport_Final.pdf