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Happy Healthy High School

Anna van der Linden – s1917986
Creative Technology
University of Twente

Supervisors:
Janet van den Boer
Roelof de Vries

Abstract

High schools in the Netherlands are trying to encourage adolescents to make healthier food choices by making their school canteens a healthy school canteen. The students, however, are not very encouraged to eat healthier and have had some concerns since the start of the healthy school canteen. By offering students an incentive for eating healthier and giving them the opportunity actively participate in the school canteen decisions the healthy school canteen can be more appealing to students. To make this possible a smartphone application prototype has been created and tested to see if a smartphone application could be the solution. The application has been tested on ten young adults and the results and feedback show that offering an incentive for healthy eating is an effective way to make healthy eating more appealing. All the other features of the application help with making sure the students feel autonomous over their food choices and their suggestions are heard. The application has only been tested on young adults that are no longer in high school, so to know for sure that the application also works for adolescents it needs to be tested with the end user in a school setting.

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Chapter 1

Introduction

In 2018 almost 11.6% of 12 to 16 year olds and 15.5% of 16 to 20 year olds in the Netherlands were overweight [28]. This may seem like a small percentage, but this translates to almost 280 thousand adolescents that are overweight [29]. This is two to three times the amount of overweight adolescents in 1980 [2]. Luckily a lot has already been done to raise more awareness about healthy eating among high schools and their students.

Teenagers spend a big part of their time at school, so the high school is regarded as an important setting that could influence the development of being overweight. Teenagers that go to high school suddenly have autonomy on how to spend their lunch breaks and what food to buy without adult supervision. At this moment, unhealthy foods and drinks are widely available at most high schools in the Netherlands or in the vicinity of the school [26]. In order to encourage students to make more healthy food choices and to develop healthier eating habits, it is therefore very important that the school food environment is healthy [6]. Food preferences are developed in childhood. By promoting and encouraging healthy food choices during childhood and adolescence, it is anticipated that healthy eating habits will be carried through to adulthood and may help prevent chronic diseases later in life [27].

Dutch high schools are now taking steps to offer and promote healthy foods in their school canteens, for example the 'Healthy School Canteen Programme' [30]. This is a support programme for high schools that provides schools with practical tools to create a healthier school canteen. This programme not only improves the school canteen, but also increases the attention for a healthier lifestyle [30]. However, adolescents do not feel the need to change their current eating patterns as long as they feel and look healthy. High school students primarily focus on the immediate benefit of unhealthy food, like the taste,

price and convenience, but are less interested in the long term effects such as illnesses [6]. 32% of Dutch high schools are participating in the Healthy School Canteen Programme and over all this programme seems to make a positive contribution to the food supply at schools [4]. However at all of these schools unhealthy products are still widely available, even in school canteens that have been awarded the gold 'plate' for being a healthy school canteen, it is still allowed for these canteens to have 20% unhealthy food options in their product range [4]. So something has to be done to make the healthy food options more attractive to high school students so that they will choose these over the unhealthy option.

When thinking of a solution to improve the popularity of a healthy high school canteen some challenges might come up. The final solution must fit the target group and must thus be very appealing to teenagers. Healthy eating is not a very popular subject among high school students, so it might be a challenge to think of something that they find interesting enough and will hopefully help them with eating healthier [6]. Especially since high school students have the freedom to eat anything they want for the first time in their lives, it will be a challenge to encourage them to make healthy choices. Technology plays a big part in the lives of teenagers nowadays [14], so it might be useful for the solution to use some kind of interactive technology so that it will be more appealing to teenagers. This information leads to the following question that needs to be answered:

How can the healthy high school canteen be made more appealing to adolescents using interactive technology?

To help answer the main question, these sub-questions need to be answered:

What has already been done at Dutch high schools to encourage teenagers to eat healthier?

What are effective ways to make (food related) technology appealing to adolescents?

This graduation project report consists of four parts. The first part consists of the background of the project and a state of the art literature review in which the two sub-questions were answered. The second part includes the ideation and specification phase

of this project. The third part is the actualization of this project, in this part the realization and evaluation were discussed. In this part the prototype was created and assessed. Finally, the last part is the concluding phase where the main research question was answered and the conclusion, discussion and future work were reviewed.

Chapter 2

State of the Art

This chapter consist of a literature review that touches two topics. The first part is about healthy eating at Dutch high schools and what the students' opinions are about healthy eating. The second part is about food related technology and what factors make technology appealing to adolescents. By doing this literature research the two sub questions were answered.

2.1 Healthy eating at Dutch high schools

Importance of eating behaviour for adolescents

There are multiple reasons why it is important for adolescents to eat healthy, like the creation of habits and social norms. According to Meiklejohn et al. [1] the most import reason is that many habits are created during adolescence. Mensink et al. [6] agrees and states that once an unhealthy habit is created it is very likely to persist into adulthood and then it becomes difficult to change. Meiklejohn et al. [1] states that as adolescents become more independent when going to high school, there are some factors that play a significant role in adolescents' eating behaviour, such as social norms, peer pressure and accessibility of food. Therefore it is more effective to promote and establish healthy habits early in life and it is important that the food environment is healthy as adolescents are influenced by their surroundings.

Other reasons why it is important for adolescents to develop healthy habits are obesity and mental and physical functioning. Mensink et al. [6] argues that promoting health to adolescents leads to healthier behaviour, higher academic achievements and a

reduction in school drop-out levels. Healthy eating is the key to good (mental) health as well as maintaining a healthy weight which is important because Hermans et al. [3] mentions that 18% of the adolescents between 12 and 17 years old are overweight or obese. The bodies of adolescents are still developing so it is important that they get the right nutrients [25]. So with healthy habits adolescents not only maintain their physical health, but also their mental health. Better mental health leads to better school results, which will help adolescents achieve their full academic potential.

Initiatives to promote healthy eating at Dutch high schools

There are multiple initiatives to promote healthy eating at Dutch high schools, of these initiatives the programme that has had the biggest impact on the eating behaviour of adolescents is the 'Healthy School Canteen Programme'. The 'Healthy School Canteen Programme' of The Netherlands Nutrition Centre is an intervention designed to create a healthy food environment and promote healthy food choices in secondary schools in the Netherlands [6]. See figure 1 for an example of a healthy school canteen by the guidelines of The Netherlands Nutrition Centre.

Figure 1. Example of a healthy school canteen by The Netherlands Nutrition Centre.

Milder et al. [4] adds that the 'Healthy School Canteen Programme' is an important programme that encourages schools to set up their canteens in an efficient way to promote healthy eating. Therefore the Dutch government plans to realize healthy school canteens in all high schools by 2015, however this goal has not been met [2]. Additionally, both Hermans et al. [3] and Evenhuis et al. [5] agree that the programme by The Netherlands Nutrition Centre is the programme that has been the most effective to change the eating behaviour of adolescents. According to a study by the RIVM [24] the students

of high schools where the 'Healthy School Canteen Programme' was implemented achieved better academic results and there were less cases of absence.

According to Van den Berg et al. [2] there are multiple initiatives that contribute to the healthy food environment of high school students besides the 'Healthy School Canteen Programme'. For example, the JOGG initiative encourages caterers and suppliers at high schools to take the responsibility for a bigger range of healthy food products [7]. Another relevant development that Van den Berg et al. [2] mentions is the establishment of the RIVM Centre for Healthy Living. This centre supports the delivery of efficient and effective local health promotion in the Netherlands for different settings, including secondary schools [8].

All these initiatives help achieving the goal of having a healthier food environment at Dutch high schools, however, healthy eating is not very popular among adolescents [7]. Even though the school canteens in high schools have become healthier over the last fifteen years, the direct surroundings of schools have become less healthy. Between 2005 and 2019 there has been a 34% increase in fast food restaurants and a 98% increase in lunchrooms [9]. These increases can especially be seen in neighbourhoods with lower incomes [9]. The JOGG initiative focusses on this issue and collaborates with municipalities to make food outlets near high schools healthier [7]. So not only the school itself influences the eating behaviour of adolescents, but also the food outlets outside of school grounds play a big part.

Adolescents' responses to healthy school canteen

Adolescents do not pay attention to what they are eating, as long as they enjoy what they are eating. According to a study by Hermans et al. [3] adolescents indicate that they do not think that healthy eating is very important as long as they do not see any physical change. They do not pay attention to what they are eating but only eat what they feel like eating [3]. According to a canteen employee at a Dutch high schools, the school wants the students to make the healthy choice, but if they like a brown bread sandwich they will not buy that intentionally because it is healthier, but just because they think it is tastier [9]. So how healthy some kind of food is, is not the most important factor that adolescents base their purchases on.

According to adolescents, the most important factors of buying food are taste, price, and variety. Adolescents base their food choices more on taste rather than how healthy that kind of food is, so most adolescents are more likely to buy food that is fattier or has a lot of sugar [3]. Another reason for this is that unhealthy food is generally less expensive. Then the question arises whether schools should ban unhealthy food altogether. According to Hermans et al. [3] this is not the right solution as adolescents are afraid that they will lose their feeling of autonomy. When they are forced to make the healthy choice, the word choice loses its meaning.

A majority of adolescents that participated in the study of Hermans et al. [3] indicated that they would like to be involved in the organization of a healthy food environment at their school. This would include creating new products, helping with preparing the food and changing the layout and design of the school canteen. However, the students are reluctant to actually participate as they are afraid that their ideas would not be heard and nothing would be put into action by their school board [3]. According to McEvoy et al. [10] schools can offer students incentives like free products, money or study points to increase student involvement.

Incentives for making healthy food choices can also help in encouraging adolescents to eat healthier. McEvoy et al. [10] suggests that using a reward system at high school canteens can influence their eating behaviour. Most students that participated preferred a point system to save up for free products [10]. According to Kane et al. [12] small economic incentives are most effective to change the behaviour of consumers. A study by Horne et al. [13] suggests that offering small incentives to children increases their fruit and vegetable consumption. So, introducing a point based reward system for buying healthy products might encourage students to choose healthy products over unhealthy products. Saving up for free products might encourage students to buy healthy snacks and lunches more often.

2.2 Adolescents and technology

What makes smartphone/online applications appealing to adolescents?

To make an interface appealing there are certain aspects the application needs and certain aspects the technology should steer clear from so that adolescents do not get distracted. According to Joyce and Nielsen [19] a smartphone/online application with an interface should not contain too much text and the font should not be too small, this will cause adolescents to lose interest and stop reading. Adolescents also lose interest if an application or other form of technology takes too long to load or buffer [19]. Adolescents like to have some interactive components, however not everything has to be interactive and do not overdo it with 'fancy' animations and sounds [19]. And lastly adolescents do not want to share everything they do with others, but they do like to have the option [19]. Adolescents are good at using technology, but they do not like it when the interface is childish and they like to have a sense of autonomy regarding sharing their experiences with others.

The main activities adolescents use technology for are passing time, connecting with others and learning new things. Children born after 2000 are raised with technology all around them and quickly learn how to use all different kinds of technology platforms [14]. Using technology is easy to learn as it is very intuitive [15]. According to a study by Radovic et al. [16] adolescents use technology for gathering information, sharing their experiences, view other's experiences and some mentioned they also use technology to achieve health goals. So adolescents do not only use technology to make connections using social media, but also use it for educational purposes and even to improve their health.

Technology fulfils our natural human need for stimulation, interaction and changes in environment with great efficiency [17]. Similar to addictive substances, technology impacts the pleasure systems of the brain, because of this, technology might provide the same kind of reward that alcohol or other drugs would [17]. It can be a social lubricant, prevent boredom or a way to escape reality [17]. For example playing challenging video games gives adolescents the feeling that they are good at something, it gives them a sense of autonomy while feeling out of control in real life [18]. Technology gives adolescents a way to escape, either through games or social media.

What food related interactive technology already exist?

Adolescents use technology throughout the day and parents try to either limit their child's technology use or try to steer them toward using their screen time for something useful. With this in mind some phone applications are created to promote healthy eating through games [20]. An example of these kind of applications is Smash Your Food [21]. This game teaches children and adolescents about nutritional values of certain kinds of food and lets them judge the healthiness of food by 'smashing' the unhealthy food options [21]. See figure 2 for game images of the application.

Figure 2. Game images of the smartphone application 'Smash Your Food'.

Another example of an application that is not a game is Fooducate. This application lets the user scan products and gives them a detailed, but easy to understand overview of the nutritional values and recipes, see figure 3 [22].

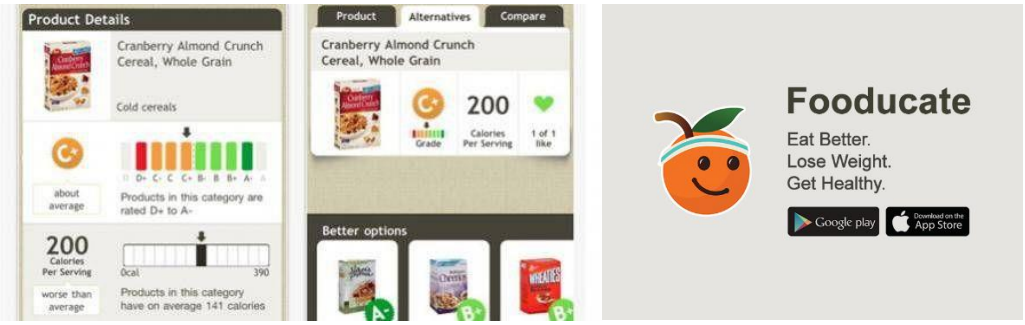


Figure 3. Content of the application 'Fooducate'.

There are a lot of these kind of smartphone applications, however there are not a lot of other technologies that are being used to encourage healthy eating for children and adolescents.

Even though there are a lot of applications and games that stimulate children and adolescents to create healthier eating habits, it might not last in the long term. Hermans et al. [23] studied the short term effectiveness of the videogame 'Feed the Alien!' see figure 4 for an image of the application.

Figure 4. Image of the application 'Feed the alien!'

Participants showed a better knowledge about the five food groups and were able to distinguish healthy food from unhealthy food. However, at the follow-up interviews, this knowledge had decreased significantly [23]. So online games or applications that teach children about healthy eating do increase children's and adolescent's knowledge about healthy eating, but in the long run, this might not be powerful to actually change their eating habits.

2.3 Conclusion

Maintaining your health is important for everyone, so it is effective to start creating healthy eating habits in childhood and adolescence. High schools play a big part in creating these habits and especially their canteen. The 'Healthy School Canteen Programme' is the programme that has had the biggest impact on school canteens and seems to have an impact on the eating habits of the students. This answers the first sub question '*What has already been done at Dutch high schools to encourage adolescents to eat healthier?*' However, the student's response to the healthy school canteen has not been completely positive. A lot of students are afraid to lose their autonomy if the school canteen is completely healthy. Schools are trying to involve their students in optimizing

the food environment. However, students are hesitant to participate as they are sceptical that their ideas will be heard and executed. One way high schools can stimulate their students to participate is by offering them an incentive. Using a reward system can also stimulate students to make healthier food choices.

Adolescents are used to being around technology all day and use their smartphones for a lot of things, like socializing and gaming. They lose interest in an application when it is slow or has too much text and information. A way to capture their attention is by using interactions, but they have to be meaningful and not superfluous. The interactions with an application need to be intuitive, but not childish.

There are a lot of online video games and phone applications with the aim of teaching children and adolescents about healthy eating. All these games are fun and quick and give a lot of information. Even though these applications seem to work on the short term, children and adolescents are not stimulated to actually change their eating behaviour long term. What does work long term has not yet been studied. Most of these applications are smartphone applications. This could be because a vast majority of the children and adolescents have smartphones, so it is easiest to make a smartphone application that they can easily download on their devices. This way the solution can be easily distributed and the user doesn't have to purchase a new product to use it. So that is the answer to the second sub question '*What are effective ways to make (food related) technology appealing to adolescents?*' The best ways to keep adolescents interested is to make an application that is quick, does not have too much text and has meaningful interactions.

Chapter 3

Ideation

In this ideation chapter several ideation methods were explored and ideas were generated and built upon to come up with the final idea that was used in this research. First the ideation method for this research was determined, then this method was executed and the results were reported and discussed.

3.1 Ideation method

According to Okudan et al. [31] there are a lot of ideation methods available with the most important ones being brainstorming and sketching. Also the braindump method and mindmapping are widely used ideation methods [32]. Due to the nature of this project, most ideation methods that were used in this research were methods that can be executed individually. To create ideas and concepts the ideation part of this research was split up into four phases. In the first phase a mindmap was made, in the second phase a braindump was done, in the third phase outside input was gathered and finally, in the fourth phase a sketchstorm was done.

Phase 1 – Mindmap

A mindmap was made of the gathered information from *Chapter 2 – State of the Art* to get an overview of all the factors of the problem that was attempted to be solved in this research. To create the mindmap the problem statement was written down and then related information was written down to build a web of relations. After that, the solutions

and ideas were connected by drawing lines between them. From this mindmap some possible concepts were created.

Phase 2 – Braindump

The concepts from phase one were written down on a white board and the braindump method was used to further build upon the ideas. In this method ideas were written down on post-it notes and those were placed on the whiteboard underneath the concepts from phase one. With this method the possible concepts from phase one were transformed to ideas that could be a solution to the problem statement.

Phase 3 – Brainstorm & Survey

As this research was individual most of the ideation was done individually, however, it is said that doing an ideation session in a group is very beneficial, as the participants are able to bounce ideas off each other and this way new visions might come to light [31]. Thus, a brainstorm session was done with fellow students doing their research in a similar field. The brainstorm was done to reach new ideas by building on others' ideas and feedback was given to improve the ideas from the previous phases. Also a survey was conducted among high school students and some results of this survey were discussed to also get input from high school students. From this brainstorm session, a final idea was selected and build further upon in the fourth phase.

Phase 4 – Sketchstorm

From all these ideation sessions the best possible solution was brought forth and then the sketchstorm method was used. This method is more often used for the actual design of products and not necessarily for a solution itself, so this method could not be used in the beginning of the ideation process but it was used after a final idea had been selected to explore the design. As there already was a concrete solution to the problem, the actual design of the solution was further explored using this method. The goal of this phase was to create some fast sketches of what the final product could look like. By visualizing the idea, it is easier to imagine what the final product would look like and see what works and what does not.

3.2 Ideation results

Results phase 1: Mindmapping

The results of the mindmap with the information from *Chapter 2 – State of the Art* are shown in figure 5.

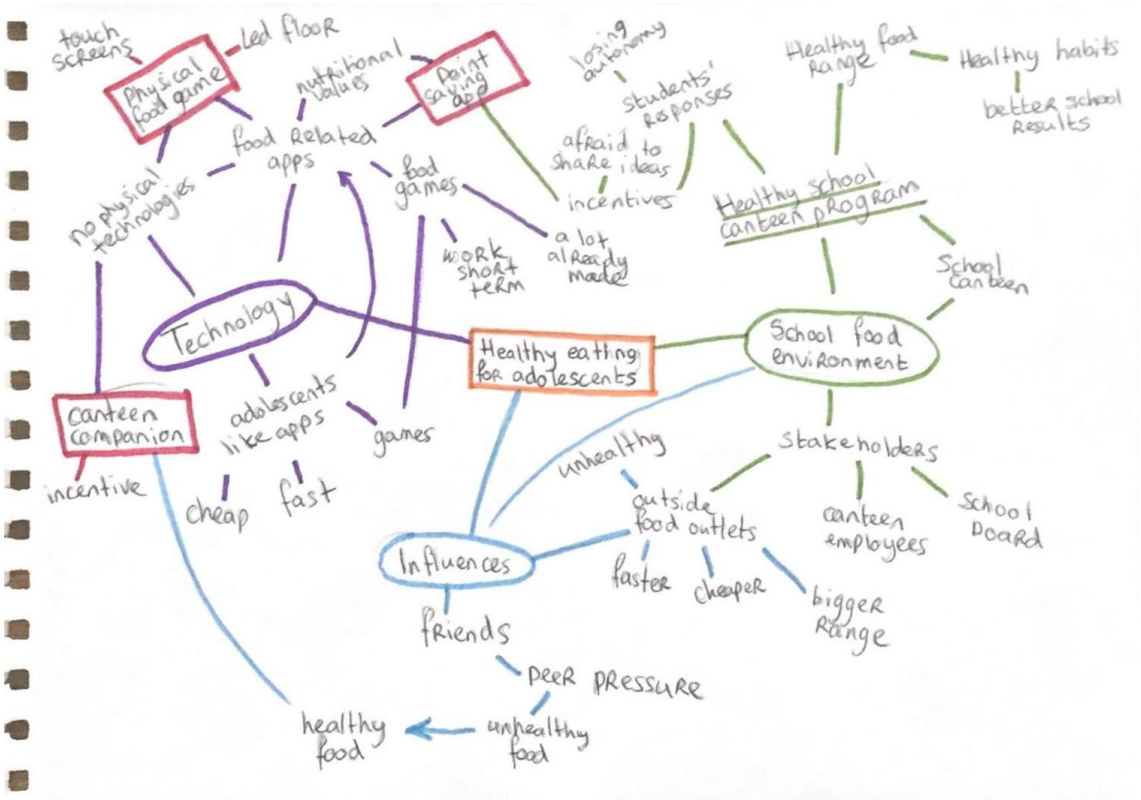


Figure 5. Mindmap of the gathered information in *Chapter 2 – State of the Art*.

In this mindmap the main problem was written down in the middle, namely 'Healthy eating for adolescents'. Then all the factors that are related to this topic were written around it. There were three main factors; the school food environment, technology and what influences adolescents. Then, building further upon these three main topics, everything related to these topics was written down and the relations between topics were visualized by lines connecting two or more items. Using these items and relations, three ideas were generated.

- A 'Canteen Companion', a physical system in the canteen that would stimulate the students to buy healthy products.

- A 'Point Saving App'. This is a smartphone application where students can save up points for free or discounts on products.
- A physical food game. All the food related games that are available now are smartphone applications or video games, but there are no food related games that use a physical kind of technology, for example an LED floor.

With these three ideas the next phase can commence.

Results phase 2: Braindump

The three concepts from the first phase were elaborated on, see table1 for a schematic overview of the results.

Table 1. Schematic of the braindump phase. The three ideas were written down at the top and the ideas on the 'post-it notes' were placed below the ideas.

Braindump					
Canteen Companion		Point saving/Ordering App		Physical Food Game	
Big screen in canteen Displays a figure/animal/ monster	Eats what students buy in canteen	All products in the canteen and their nutritional values Students can order with app	Get 'Healthy Points' (HP) with healthy purchases Save up for free products	LED floor LED wall	Stomp or punch unhealthy food Physical version of 'Smash Your Food'
Encourages students to buy something healthy	Figure is sad/angry when forced to eat something unhealthy Gaines weight	Use app to send in ideas for new healthy products When idea is accepted get HP	School wide ranking of who has the most HP per week/month	Calorie counter of all the food that has been smashed Minus points if healthy food is smashed	Fun quick game that can be played for a long and a short amount of time
Figure talks to the students Healthy facts and tips	Figure is happy when eating something healthy Loses weight	Display some healthy tips/facts when opening app or when order is being send	Different food categories and put all unhealthy food in one category At checkout have the option to grab a healthy snack	Points are school total of one day Compete with other schools	
		Students vote for their favourite products to be	Make the canteen feel like a fast food restaurant		

		in range next week Different products every week	Big screen that displays when your order is ready		

In the schematic all the 'post-it notes' can be seen. This way the three vague concepts were turned into actual products. The first product is the 'Canteen Companion', this is one or multiple screens that are hung in the canteen. On the screen a figure, animal or monster is displayed that will eat what the students buy in the canteen. This creature enjoys eating healthy food and hates unhealthy food, so when a student buys an unhealthy product the figure is sad or angry. The figure will also gain weight or get bigger. When a student buys something healthy it makes the figure happy and it will lose weight or becomes smaller. The figure will talk to the students about healthy food and will give tips and facts. This way the students can be encouraged to buy a healthy product instead of an unhealthy product so that they will not upset the creature.

The second concept in the first phase was the point saving application, but that concept has evolved into a broader food ordering application. In this application students can see all the products that are available in the canteen and their nutritional values, these nutritional values will be displayed in such a way that it is easy to understand for adolescents. By ordering healthy products students can collect 'Healthy Points' (HP) and use these for discounts or free products. Other features of this application could be a school wide ranking system of who has the most HP per week or month. Research showed that students want to be involved in creating new products for the school canteen, but are reluctant to do so [3]. So another feature could be an opportunity for students to easily send in their ideas for new products through the application. And when an idea is accepted the student receives an amount of 'Healthy Points'. The application can also be used to display some quick facts and tips about healthy eating, for example when the application is loading. Another feature of the application could be that every week the food range in the canteen is slightly different and every week the students can vote for the products that they want to have in the canteen the following week. This might help with giving them a sense of autonomy over their food choices. In the application all the products are arranged per category, but the unhealthy products are put under one category so that students consciously have to make the choice for an unhealthy product. When the students are ready to place their order in the application they get the

opportunity to grab a healthy snack, which is also the case in actual canteens where the healthy snacks are placed next to the register. To make the healthy canteen feel less like a healthy canteen and more like a fast food restaurant there could be a screen above the canteen that displays when the order is ready. This smartphone application has a lot of possibilities to make it appealing for students to use it and since it is a smartphone application, the students can easily download it on their smartphones.

The third concept is the physical food game. There are a lot of food-based games on a digital platform, but there are no physical food games that use technology. The physical food game could be a physical version of the game 'Smash Your Food' [22]. It consists of an LED floor or an LED wall which will display healthy food and unhealthy food. Students then have to 'smash' the unhealthy food by stepping on it or tapping it on the wall. The unhealthy food that has been smashed will then display some of its nutrients, like calories, fat and sugar. These nutrients will then be calculated to points and added to a counter. When healthy food is smashed points will be deducted from the score. The students have to play together to get the highest amount of points as possible. The counter will reset every day and the score of each day will be added to a monthly counter. If multiple schools implement this game there could be competition between schools to see which school is the healthiest on a daily and monthly basis.

Results phase 3: Brainstorm & Survey

In table 2 the schematic of the second phase can be seen with added comments from the brainstorm in red.

Table 2. Schematic of the braindump from phase two, see figure 6, with added comments from the brainstorm showed in red.

Brainstorm					
Canteen Companion		Ordering App		Physical Food Game	
Big screen in canteen Displays a figure/animal/ monster	Eats what students buy in canteen	App with all products in the canteen and their nutritional values Students can order through the app	'Healthy Points' with healthy purchases you get healthy points Save up for free products	LED floor LED wall	Stomp or punch unhealthy food Physical version of 'Smash Your Food'

Encourages students to buy something healthy	Figure is sad/angry when forced to eat something unhealthy Gaines weight	Use app to send in ideas for new healthy products When idea is accepted get HP	School wide ranking of who has the most HP per week/month	Calorie counter of all the food that has been smashed Minus points if healthy food is smashed	Fun quick game that can be played for a long and a short amount of time
Figure talks to the students Healthy facts and tips	Figure is happy when eating something healthy Loses weight	Display some healthy tips/facts when opening app or when order is being send	Different food categories and put all unhealthy food in one category At checkout have the option to grab a healthy snack	Points are school total of one day Compete with other schools	Display the nutritional values of the food that is displayed
Might work better for primary school children	Might backfire if students try to get the creature as big as possible Test the boundaries	Students vote for their favourite products to be in range next week Different products every week	Make the canteen feel like a fast food restaurant Big screen that displays when your order is ready	Competition between schools is good What would be the prize?	What would be the incentive to eat healthier
		Do school wide HP totals	Give students a choice to share their HP total	The installation has to be very sturdy	
		Can Dutch high school students use their smartphones during school hours?	Not all students can afford to buy something every day so the point total might not be fair		

The general feedback for the first idea, the canteen companion, was that over all the idea was good, but it might work better in a primary school setting with younger children. It would be hard to think of a creature that is not perceived as childish by adolescents. Another issue would be that the students might want to test the boundaries of the creature. The students might buy even more unhealthy food to see how big the creature can get, so using this technology might actually backfire and thus completely miss the goal of this research. The canteen companion could work to encourage students to eat healthier, however it could also backfire as students might want to test the boundaries, and thus eat unhealthy.

For the second idea, the overall feedback was good. As adolescents use their smartphones a lot, and as it is allowed for students to use smartphones in Dutch high schools, it would be very useful to make a smartphone application. One concern was regarding the sharing of the students' 'Healthy Points' total with others. Not all students would want to share their points, so there needs to be a setting in the application that students can choose whether they want to share their point total. Another issue was that some students can afford to buy something every day and some students cannot, so some kind of system should be developed to make the point system as fair as possible. The final remark was to add a school wide point total, so that schools can compete with other schools, like with the physical food game idea. By adding a small competitive element, students might be more inclined to buy healthy food at the canteen. The only thing that the application does not have is a gamification element, however the background research showed that food games do not work long term, so a gamification element might not be necessary. This smartphone application uses an incentive that encourages students to buy healthy products and it makes use of a lot of other features. Because of this, the smartphone application has the most potential to encourage adolescents to eat healthier.

For the third idea, the overall feedback was also good. Using this physical game students can blow off some steam, but that also means that the installation has to be very sturdy. The game also needs to display very clearly what the nutritional values of the food are otherwise the students that play the game do not learn enough about what is healthy. With this kind of game there is not really an incentive to eat healthier so it only teaches the students about healthy and unhealthy eating. The competition between the high schools that use the game is a good incentive for students to play the game, however there needs to be a reward for the winning school and this reward needs to be appealing enough so that students actually want to win the competition. The physical food game could be useful to teach students about healthy eating through a game. The game does not, however, encourage students to eat healthier and does not offer an incentive, like free products. Some elements from this idea can be combined with the ordering application idea. The between school competition of which school is most healthy can be added to the 'Healthy Points' ranking of the ordering application.

In the survey that was conducted at a Dutch high school some statements about improving the canteen were asked. See table 3 for the statements and the responses of the students, there were 107 participants.

Table 3. Survey statements and the students' responses.

Question	Response
I want to know what the nutritional values of the products in the canteen are.	Completely agree: 11% Agree: 13% Neutral: 29% Disagree: 31% Completely disagree: 16%
I would like it if technology is incorporated in the school canteen.	Completely agree: 34% Agree: 34% Neutral: 18% Disagree: 10% Completely disagree: 4%
If I could save points to save up for free products, I would use the school canteen more often.	Completely agree: 21% Agree: 36% Neutral: 28% Disagree: 13% Completely disagree: 2%
If there was a competition between schools to see which school is the healthiest, I would buy healthy products more often so that my school would win.	Completely agree: 10% Agree: 13% Neutral: 24% Disagree: 34% Completely disagree: 18%
I think it is important to have the opportunity to make suggestions for new products.	Completely agree: 18% Agree: 45% Neutral: 28% Disagree: 8% Completely disagree: 1%
I know where I can make a suggestion.	True: 29% False: 71%

The responses of the high school students indicate that most students would use the canteen more often if they could save up points for free products and they think it is important to make suggestions but they do not know how. This is in line with the results of the literature research. Students are not very interested in the nutritional values of products and a majority would not be encouraged to eat healthier by a competition between schools, perhaps a competition between the students of one school might be a way to encourage them. A majority of the students would like it if there was technology incorporated in the school canteen.

So, from the results of the brainstorm and survey phase, it has been made clear that the food ordering application has the most potential out of all ideas to encourage high school students to eat healthier and will thus be used in this research.

Results phase 4: Sketchstorm

In the third step it has been concluded that the ordering application was used in this research, however the design of the application needed to be further explored. The background research showed that when designing for adolescents some factors have to be taken into consideration. There should not be too much text on the screen and the font should not be too small, this might cause adolescents to lose interest. Applications should not take very long to load or buffer, however this loading time can be used to display some healthy tips and facts. All the interactions have to be meaningful and there should be no unnecessary animations and sounds. Adolescents do not want to share everything, so they have to be given the option to share or unshare their 'Healthy Points' total. With these factors in mind, the interface of the application was designed, see figure 6 and 7 for the results of the sketchstorm. As the application was designed for Dutch high schools, the text inside of the application is also be in Dutch, the comments are, however, in English.

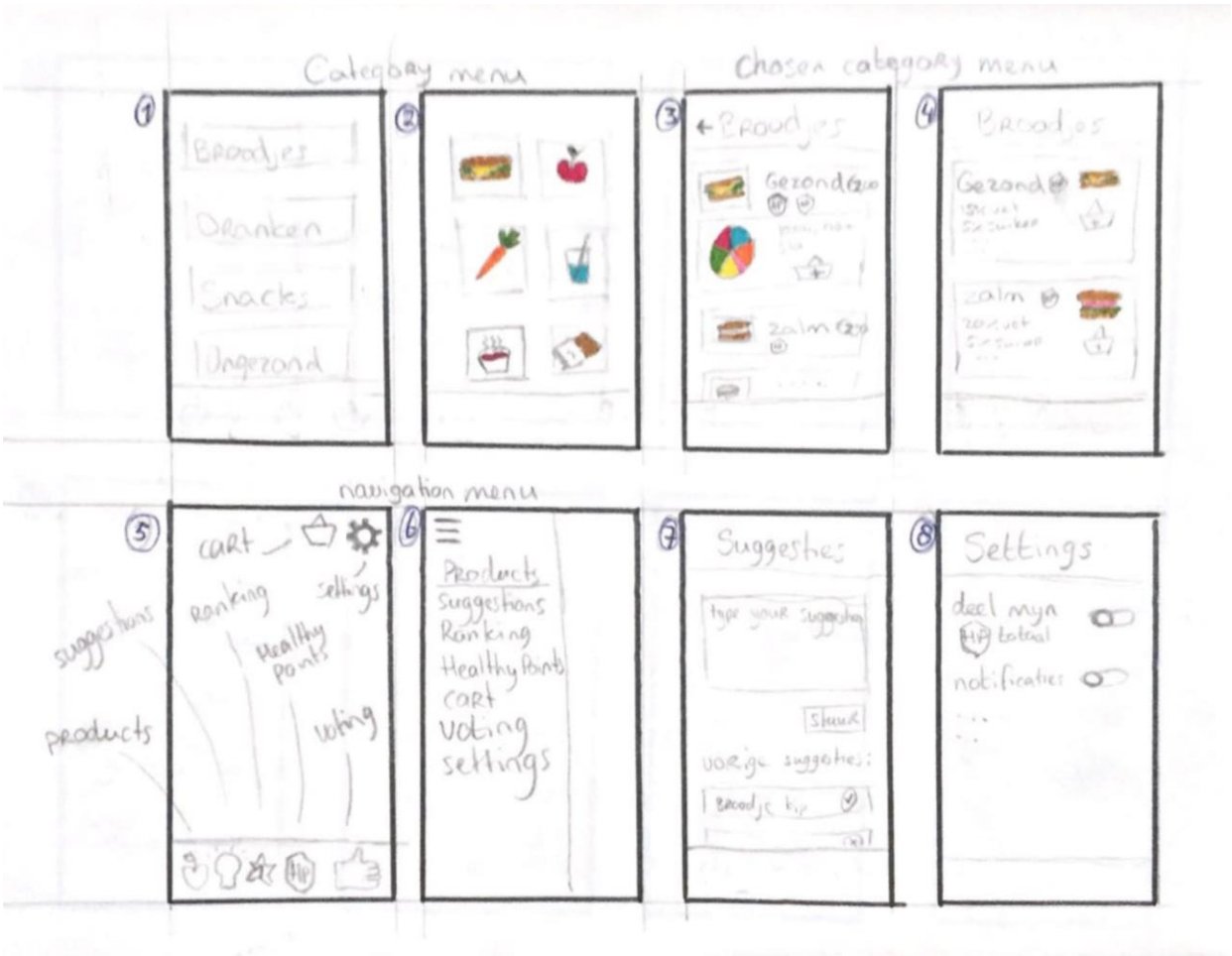


Figure 6. The sketchstorm result of the interface of the category menu (1, 2), the chosen category menu (3, 4), the navigation menu (5, 6), the suggestions screen (7) and the settings screen (8).

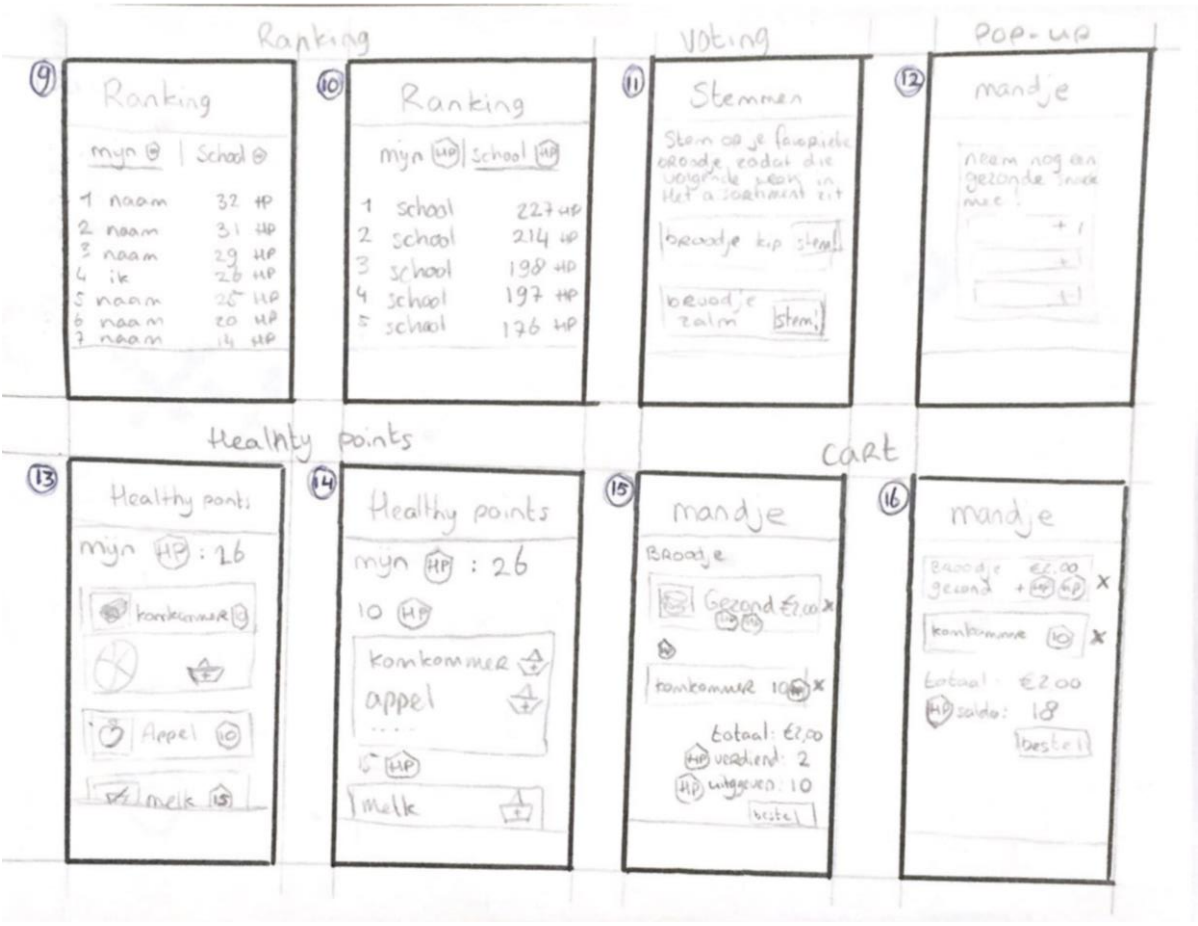


Figure 7. The sketchstorm result of the interface of the ranking screen (9, 10), the voting screen (11), the pop-up screen (12), the healthy points screen (13, 14) and the cart screen (15, 16).

In the sketchstorm the interfaces of all the features of the application were quickly drawn out, considering multiple different designs for some of the features. As it is better to use an interface with as little text as possible, it is best to use an interface that makes use of icons more than plain text. Because of this reason, the navigation menu of figure 6.5 was used, as well as the product category menu of figure 6.2. When a product category has been chosen all the products of that category are displayed on screen. Displaying the nutritional values of the product can be done with either a small pie chart or a list with percentages. As a list might be perceived as not very interesting by adolescents, a pie chart is the best option for displaying the nutritional values as seen in figure 6.3. For the features like suggestions, settings, ranking school wide, ranking between schools, and voting a simple and clear list interface will be used, as can be seen in figures 6.7, 6.8, 7.9, 7.10 and 7.11, respectively. The interface of the 'Healthy Points' overview could be arranged in two different ways. The products which can be bought with 'Healthy Points'

can be arranged either by category or by the amount of points a product costs. As the second option gives a clearer overview of what a student can buy with the saved up points, the interface of figure 7.14 was used. For the interface of the shopping cart it could be either a simple list of the products in the cart, that only shows the product name, price and gained healthy points. The interface could also show again the nutritional values of the product and sort the products by category. As the interface of figure 7.16 is shorter and thus gives a clearer overview, that is the interface that was used. In figure 7.12 the interface can be seen of the pop-up after the student has clicked the order button where the student can decide to grab a healthy snack along with their order.

The figures that are used for the product category menu will be pictures of products that represent that category. The schools can ultimately choose their own categories and thus their own images for these categories. For the prototype, some standard categories and images were used.

So after this ideation method, the design and interface of the application have been decided; a simple interface where the use of text is as little as possible, instead images, icons and charts will be used. The colours of the application are simple and not too many were used to give the application a more professional appearance and so that the application does not come across as childish to adolescents.

Chapter 4

Specification

This chapter describes the specifications of the proposed product from the previous chapter, *Chapter 3 – Ideation.* By defining the features and a user scenario, it made the concept into a concrete plan for an actual smartphone application. First the requirements are defined, these requirements were brought forth from the previous chapter. Then these requirements were used to create a user scenario and the features of the application were defined.

4.1 Requirements

In order to create the prototype, first the features that are described in *Chapter 3 – Ideation,* had to be specified. These features were:

- Order products
- Save 'Healthy Points' (HP) to get free products
- Overview of school wide and between schools ranking of HP
- Students can send in suggestions and new ideas
- Students can vote for their favourite products

Other technical requirements the smartphone application needed to take into account were:

- Clear interface without too much text
- Use the buffering/loading time to display healthy tips and facts
- Make the canteen feel like a fast food restaurant by hanging up screens
- Students can log in with their school account

In order to further demonstrate how an application with these features and requirements could function a user scenario was given. This user scenario is created by combining information from literature research and my own experiences in high school. With the user scenario and all the features and technical aspects clear there was enough information to develop a prototype.

4.2 User scenario

Emily is a second year student at a Dutch high school. During the lunch break she often spends her time with her friends in the cafeteria. She always brings her lunch from home that her mother makes for her. One of her friends often buys lunch from the school canteen. This canteen is a healthy school canteen and thus has a lot of healthy sandwiches and snacks. At Emily's school students can order products through an application on your smartphone. Emily's friend orders a sandwich through the application and Emily also feels like ordering a snack to eat after she eats her lunch. She looks at the options and debates what to buy, she can either get a chocolate bar or a fruit salad. She decides to get the fruit salad as this will give her two 'Healthy Points' (HP) whereas the chocolate bar gives no HP. She checks the 'Healthy Points' page and sees that with the points from the fruit salad she will have enough HP to get a free yoghurt. She will get the yoghurt tomorrow. She clicks on the order button and the 'grab a snack' page pops up. Emily debates getting some cucumber slices as well, but she decides she will get that another time. Emily places her order and pays with her bank account application on her phone. Emily looks at the 'ranking' page of the application and sees that with her recent order she has gone up to the seventh place in the whole school, this makes her feel good about the healthy choice she has made. Emily asks her friends what sandwich they want to have in the canteen next week, so they can vote for that sandwich. Emily and her friends vote for the chicken sandwich as that sandwich was the idea of one of her friends. Her friend sent in the idea through the 'Suggestions' page in the application and it was accepted, rewarding her friend with some HP. Emily looks at the screen above the canteen and sees that her order is ready so she heads over to the canteen to pick it up. By ordering through the application she only has to leave for a short time, as she does not have to stand in line to buy something from the canteen. This way she has more time to socialize with her friends.

4.3 Features

In the user scenario most of the features were described in a user setting, now a more detailed description was given. First some technical aspects of the applications were given and then the different features were described. All of the features of the application have their own page in the application.

Technical aspects

As this application will be used by high school students and these students already have a school account, this account can also be used to login to the application. Students do not need to make another account and all their data can be used from the school database.

Another important part of the product are the screens above the canteen. These will be used to display what orders are being prepared and what orders are ready to be picked up. This will make the canteen feel like a fast food restaurant as these usually use these kind of screens. Besides the screens above the canteen, there also has to be a system for the canteen employee to see the orders that have to be prepared and where they can indicate when an order is ready.

The time that the application needs to start up, or when sending in an order, can be used to display healthy tips and facts. This will fill up the buffering time which usually is not used for anything. These facts and tips will be tips like 'Did you drink enough water today? You should drink 2 litres of water every day' and 'Protein helps you to grow strong. Protein can be found in foods like eggs, chicken, peanut butter and fish' [33].

The application was designed to be used at Dutch high schools, so the prototype was made in Dutch. Ultimately canteens can use their own product range in the application and make their own food categories in the application. For the prototype some standard categories were used, these categories were sandwiches, fruit, vegetables, drinks, warm products like soups, and unhealthy snacks.

Ordering

Students can view all the products that the canteen sells in the ordering page. All products are divided into different categories, which ultimately the school can choose themselves

as all schools have a different product range in their canteen. In a category page students can see all the products, their price and how many 'Healthy Points' buying that product gives them. When a student wants to order a product they first have to click on it and it will display all the nutrients, then the 'add to cart' button will be visible. The nutrients are displayed as a pie chart that is easily understandable for the students. When the student is ready to order they go to the 'cart' page to see what they are going to order, with the option to remove the item or add more of a specific item. It will also display the total costs and their new HP total, this will either be more if the student gets new HP or less if the student uses their HP to get a free product, or a combination of the two. When the student clicks the order button, a page pops up giving them the opportunity to grab a healthy snack, just like the snacks are placed next to the register in the actual canteen. Students can add a snack to their order, or not, and then place the order. Students can pay immediately with their bank application on their smartphone, but if they do not have this they can also pay at the register when they go pick up their order. Here it is also important that the student has to log in with their school account, so that the school can track that students actually pay for their orders and students cannot abuse this feature by placing orders without picking them up or paying for them.

'Healthy Points'

In the 'Healthy Points' page students can see their HP total and see what products they can get with these points. The available products are grouped by the amount of HP they cost. Students can add the product to their cart, and the HP total changes accordingly. Students can see the products that cost more HP than they have, but they cannot add these to their cart.

Ranking

In this page students can see their own HP total and a school wide ranking of who has the most HP. Here students can also indicate whether they want their HP total to be visible to other students. Students can also see the between school rankings. Regardless of whether the student wants their HP total to be visible in the school wide ranking, their HP total will be taken into the school HP total.

Suggestions

In the 'suggestions' page students have the opportunity to give suggestions for new products that can be sold in the canteen. When the student sends in their idea, they can see whether their idea is pending, accepted or rejected. When their idea is accepted they will get some HP for their contribution. Here it is also important that the student has to log in with their student account so that the school can see who send in the suggestion, this way students cannot send in inappropriate or unrelated messages without the school knowing who send it.

Voting

In this page students can see all the sandwiches that can be made in the canteen and the students can vote for the sandwiches they want to be in range the next week. This way the canteen has a big range, but not every sandwich is always available. Every student can vote once per week and this way they might feel more in control of their food choices.

Chapter 5

Realization

In this chapter, the concept from *Chapter 3 – Ideation* together with the features as explained in *Chapter 4 – Specification* was developed into a prototype smartphone application. In this chapter first the method of the development was explained, then the main design and interface of the application were discussed, lastly all the screens of the prototype application were explained and the possible interactions were showed. In appendix A the whole prototype setup can be found.

5.1 Method

To develop a working prototype that can be used as the plan for the eventual smartphone application Adobe XD was used. The prototype can only be used to visualize what the application looks like and what kind of interactions there are in the application. To explore all the features of the application all the interactions are build into the prototype, so there are a set of standard interactions that are 'hardcoded' into the application. This way the prototype can, to some extend, be used as if it is the actual application without needing to actually program it.

5.2 The prototype

In this prototype application, the features that were described in the previous chapter can be used as if it is a real smartphone application. This application was designed to be used

at Dutch high schools, so the application is also in Dutch, however, for clarity some Dutch words that are used in the prototype were translated to English. The prototype application consists of seven different screens, which can be seen below. The main design of the prototype application was made according to the five design requirements for adolescents as can be read in *Chapter 2 – State of the Art*. The background was a colourful yet not childish display of some healthy food and this background was used throughout the whole application. Most of the text in the application was green and some green accents were used throughout the application, as this colour is usually associated with healthy food. In figure 8 the general layout of the application pages can be seen.

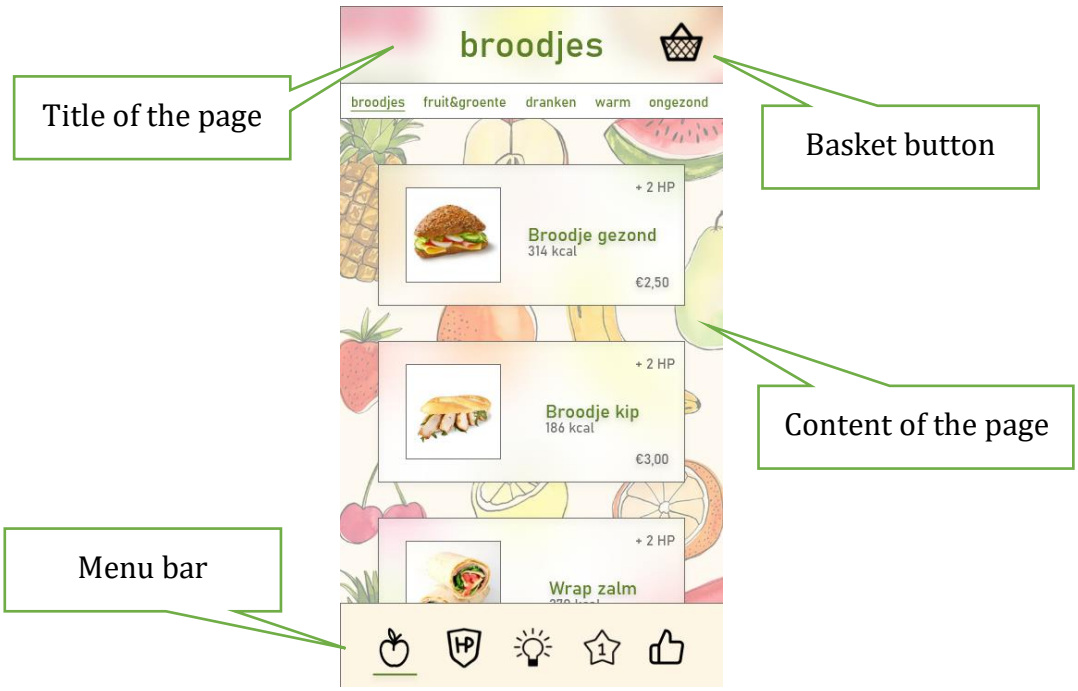


Figure 8. General interface of the application.

In all the screens of the application the menu bar and basket button can be seen. The basket button can be found at the top right of the screen and a general menu bar was placed at the bottom of the screen. In this menu bar the five main functions of the application can be found, this menu bar can be seen in detail in figure 9. The green bar underneath the icons, in this case the products icon, shows the student what page they are on.

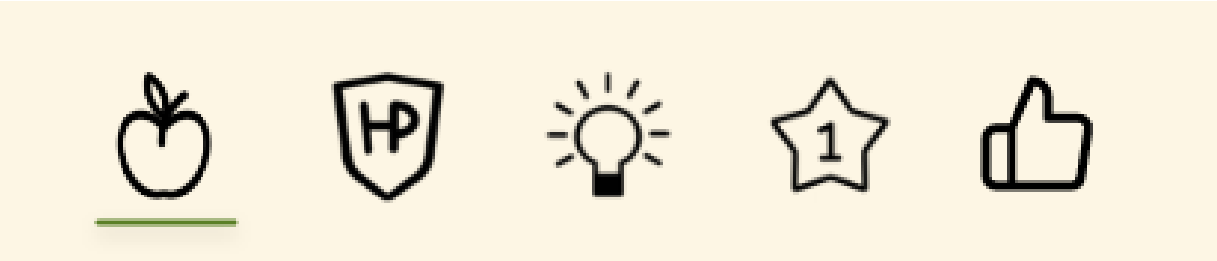


Figure 9. Menu bar with the buttons of the five main features of the application. In order from left to right: products, 'Healthy Points', suggestions, ranking and voting.

Splash screen

When the application is starting up it needs some time to load. This is not the case with the prototype, however, this starting up page, or splash screen, still needed to be designed. In figure 10 the splash screen is showed.

Figure 10. Splash screen of the application.

The time it takes the application to start up can be used in a beneficial way. At the bottom of the screen a healthy tip/fact can be seen. In this prototype it was only one tip, but in the actual application there will be multiple tips/facts that are generated randomly so that every time someone opens the application it displays a different tip/fact.

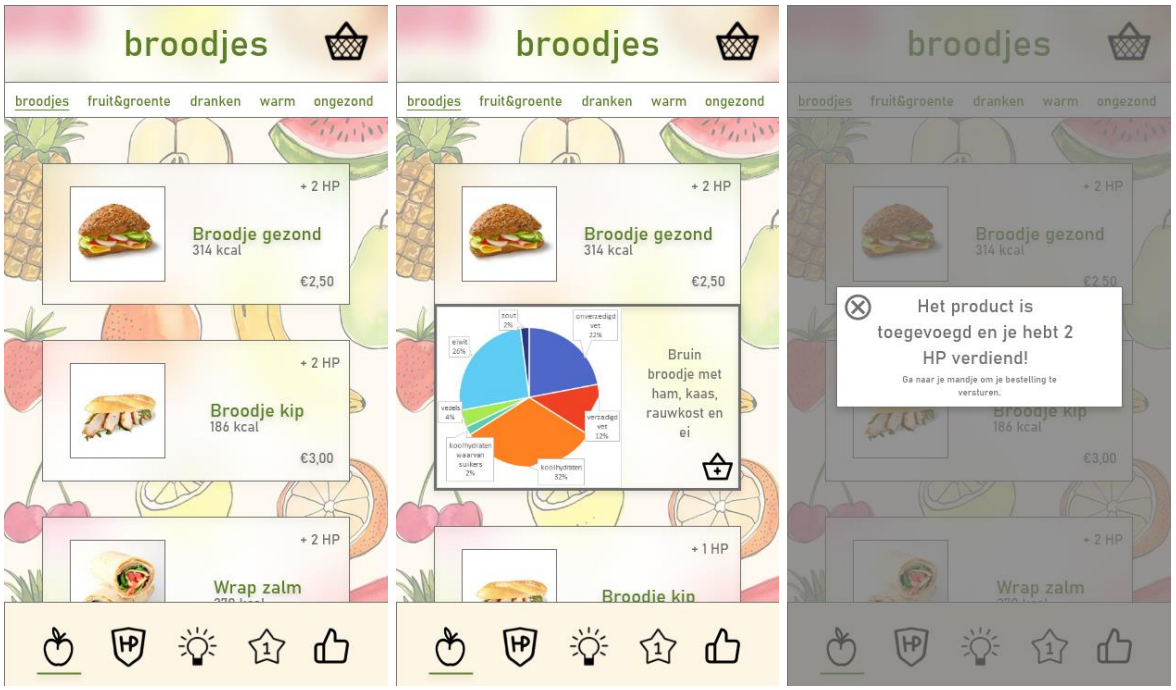
Products page

When the application is done loading the application's menu can be seen. The application opens into the first page of the products menu, as can be seen in figure 11. In this prototype some standard food categories can be seen, each filled with some standard products. In these screens all the products that are available in the canteen can be found. Eventually schools can make their own categories and put in their own product range and prices. At the top of the screen, below the title, the categories menu can be seen, this menu can be used to switch between the different product categories. With all the products the amount of calories that is in that product are displayed, as well as the price and the amount of 'Healthy Points' you receive when you buy the product. While looking at the products you cannot add anything to your basket yet, this is only available when you click on the product you want and the nutritional values are displayed, see figure 12.

(a) (b) (c)

(d) (e)

Figure 11. The five product screens of the application; sandwiches (a), fruit and vegetables (b), drinks (c), warm products (d) and unhealthy products (e).



(a) (b) (c)

Figure 12. The sandwich screen (a), the sandwich screen with the nutritional values of a sandwich showed (b) and the pop-up message when the product is added to the basket (c).

So when a student wants to add a product to their cart, they are forced to also look at the nutritional values. These nutritional values are displayed as a pie chart, so it is easy to see what the product consists of, see figure 13. To the right of the nutritional pie chart, the ingredients of the product can be seen and in the bottom right corner the 'add to basket' button is placed, see figure 12b. Then after the student added the product to their basket a message pops up to confirm that the product was added, see figure 12c. When this message is open the only button that can be clicked on is the close button at the left top of the message to be sure that the student has seen the conformation message; this goes for every time a pop-up message like this is seen. The message can be closed and the student gets back to the product screen they started with, in this case the screen of figure 12a.

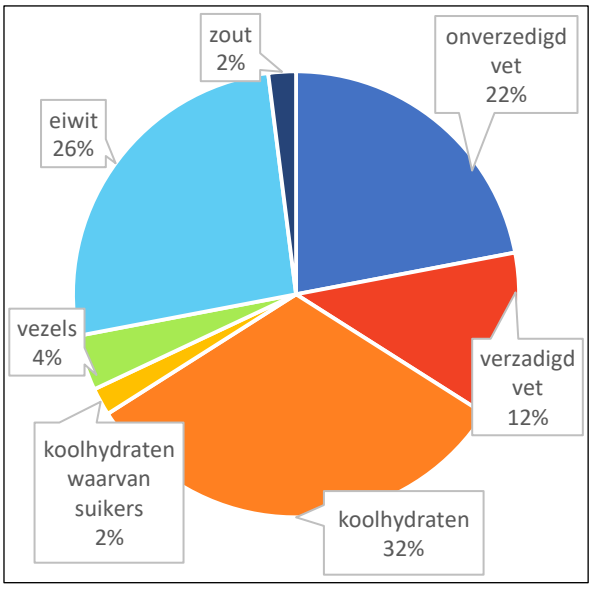
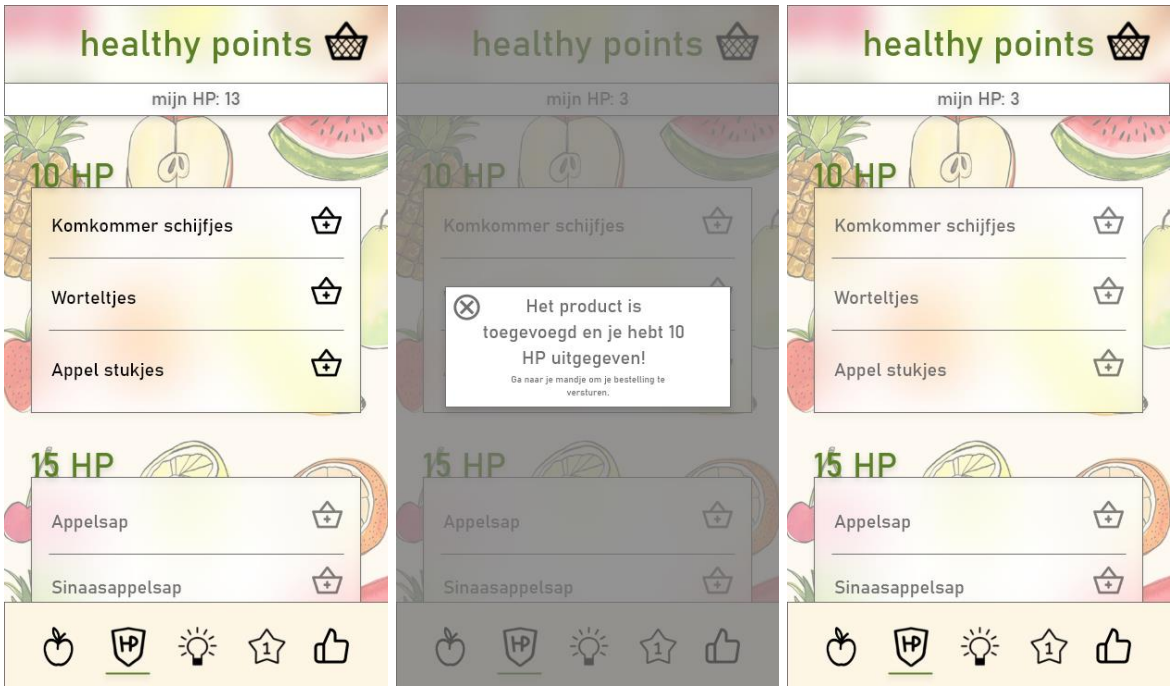


Figure 13. Pie chart of the nutritional values of a healthy sandwich.

'Healthy Points' page

The second screen that can be navigated to using the menu bar is the 'Healthy Points' screen, see figure 14.



(a) (b) (c)

Figure 14. The 'Healthy Points' screen (a), the pop-up when an item has been added to the cart (b) and the 'Healthy Point' screen with the amount of HP spend has been taken off the HP-total (c).

In this page the student can see their HP-total[1], and use these points to get free products. In this case the student has 13 HP, so he can only choose from the products that cost 10 HP. The products that cost more HP are written in grey to indicate that those products are not available, see figure 14a. The student chooses, for example, cucumber slices[2] and adds this to his basket. The message pops up to confirm that the product is added, as can be seen in figure 14b. Then the 'Healthy Points' screen can be seen again, however, the HP-total has been reduced to 3 and no products can be added to the basket anymore, thus now all the products are displayed in grey, see figure 14c. Eventually, these items can also be filled in by the school based on the products in their canteen.

Suggestions page

In the suggestions screen, students can give suggestions for new products, as can be seen in figure 15. In this screen a suggestion can be filled in, by choosing the category the product will belong to, the name of the product and the ingredients of the product, see

[1] In the prototype this is called 'mijn-HP'.
[2] In Dutch: komkommer schijfjes

figure 15a. In figure 15b a suggestion has been filled in, in this case a chicken sandwich. When the suggestion is send in a message pops up to confirm as can be seen in figure 15c. After the pop-up is closed the suggestion is added to the list of previous suggestions[3].

At the top of the screen a message can be seen where the suggestions page is explained and a warning is given. To prevent students from sending in inappropriate messages they are reminded that the school can see who send in the messages. At the bottom of the screen a list of all the suggestions the student has made can be seen. With all the previous suggestions an icon shows whether a suggestion has been accepted, and if that is the case how many HP the student received for it, if a suggestion is rejected or if the suggestion is still pending, see figure 16.

[3] In Dutch: vorige suggesties

Figure 15. Suggestions screen (a), suggestions screen with a suggestion filled in (b), pop-up after a suggestion has been send in (c) and suggestions screen where the send in suggestions has been added to the list of previous suggestions (d).

Figure 16. Previous suggestions made and their status icons; pending (top), rejected (middle) and accepted plus amount of HP received (bottom).

Ranking page

The ranking screen consist of two pages, one for the school wide ranking and one for the between schools ranking see figure 17. In figure 17a the school wide ranking screen can be seen with in this case the personal HP-total of 48 HP, which places this student on the seventh place. At the top of the screen a slider can be seen next to the words ‘mijn HP’. This slider can be used to turn off the sharing of the student’s HP-total, as can be seen in figure 17b. Now the student’s name is removed from the list. In figure 17c the between schools ranking can be seen, in this case the student’s school is in second place.

(a) (b) (c)

Figure 17. School wide ranking screen with personal HP-total shared (a), school wide ranking with personal HP-total not shared (b), between schools ranking screen (c).

Voting page

In the last page that can be accessed by the menu bar is the voting screen, see figure 18. In the voting screen students can vote for a sandwich that they like and the sandwich with the most votes will be offered as a special the next week. At the right side of each option the percentage of students that have voted for that sandwich can be seen, as can be seen in figure 18a. Below the name of the sandwich the ingredients of that sandwich can be seen. Then a student can vote for a sandwich by clicking the thumbs up icon. When a student has voted a check mark will appear next to that sandwich, see figure 18b. In this case the student voted for a salmon sandwich[4], as well as 41% of the school. Every student can only vote once per week.

[4] In Dutch: broodje zalm

(a) (b)

Figure 18. Voting page with possible products to vote for (a) and voting screen when a student has voted for a product (b).

Basket page

When a student clicks on the basket icon at the top right of the screen they see the basket page. When the student has not yet added anything to their basket, the basket is empty, see figure 19.

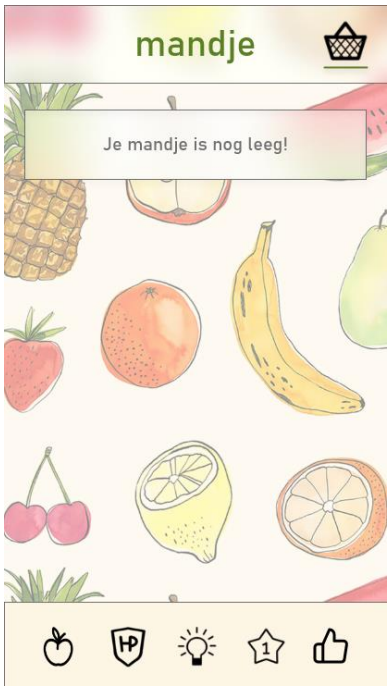


Figure 19. Empty basket screen.

When a student did add something to their basket they see the basket screen of figure 20.

(a) (b)

Figure 20. Basket screen when the basket is filled with some items (a) and basket after one of those items is removed (b).

In this case the student has three items in their basket, a chicken sandwich[5], apple juice[6] and cucumber slices. The cucumber slices have been bought with 'Healthy Points', as can be seen in figure 20a. With every item in the basket it shows how much that product costs, either in euros or in HP, and how many HP the student receives by buying the product. Then at the bottom the total amount that the student has to pay is shown and their new HP-total can be seen. With the red X's to the left of the products the student can remove an item if they change their mind. In this case the student has removed the juice from their basket and the subtotal and the new HP total changed accordingly, see figure 20b. To continue with their order the student has to click on the green arrow beneath the new HP-total. After clicking this button the pop-up where the student can pay can be seen, see figure 21. In the pop-up the student can choose to grab a healthy snack by clicking the + sign. In this case the student added carrots[7], so the green check mark can be seen in stead of the + sign. The student can also choose if they want to pay with their bank account application if they have that on their phone, otherwise they can choose to pay in cash. This can be done by clicking one of the radio buttons. When the student clicks the ordering[8] button their order will be send.

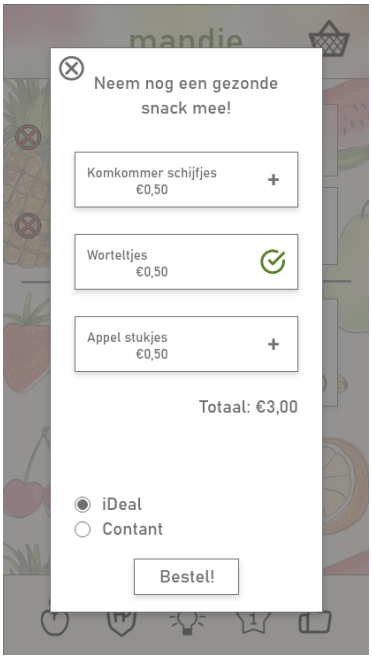


Figure 21. Pop-up where the student can pay for their order and grab a healthy snack.

[5] In Dutch: broodje kip
[6] In Dutch: appelsap
[7] In Dutch: worteltjes
[8] In Dutch: bestel

While the order is being send to the canteen the loading page similar to the splash screen can be seen, see figure 22. In this screen, the loading time is once again used to display a healthy tip/fact.

Figure 22. Loading screen when an order has been send.

Chapter 6

Evaluation

In the evaluation phase of this research, the prototype that has been created in *Chapter 5 – Realization* was tested to evaluate whether the prototype was intuitive to use and all the features work they way they were intended. Another aspect that was tested was whether the participants actually saw the benefit of the application and if they would actually use this application. The user test consisted of two parts, first the prototype was used and evaluated by the participants and the second part was a follow-up interview to receive in depth feedback. The user test was done using Google Forms and the interviews were done through Skype. As the application is meant to be used at Dutch high schools, the prototype is in Dutch and all the participants attended a Dutch high school, the user test was also done completely in Dutch. In this chapter first the user test is explained and then the results of the test are shown. Finally, the results of the user test were used to make improvements to the prototype.

6.1 Method

Participants and recruitment

Participants were recruited through social media. Requirements for participation were that the participant must be aged between 18 and 25 and had attended a Dutch high school. The participants were send the information brochure, see appendix B. After the participants were recruited, they were send the informed consent form, see appendix C, and the user test, see appendix D, along with the prototype. Ten participants partook in this study. The responses were translated into English.

Part one: Interaction with prototype

The user test consisted out of two parts, namely interacting with the prototype and a follow-up interview. During the first part the participants had to interact with the prototype by following a list of actions and answer questions about these actions. Before the participants started with the actions, they were asked to identify the icons in the menu bar and write down what they thought the icons meant. See figure 9 in *Chapter 5 – Realization* for the menu icons. Then the participants started with the eight actions. These actions consisted of locating elements in the prototype and questions to check if the participant executed the action correctly. After each action the participant had to evaluate their performance and give feedback on how the action went by indicating on a five point scale how easy the action was (very easy/easy/not easy, not difficult/difficult/very difficult), then there was room for the participant to give feedback on why the action was easy/difficult for them. The eight actions were:

- Action 1 – Empty basket

  The participant had to navigate to their basket and report on what was in the basket. At that moment the basket should have been empty.
- Action 2 – Healthy Points

  The participant had to navigate to the 'Healthy Points' page and look up how many HP they had. At that moment the HP total should have been 13. Then the participant had to use their HP to add cucumber slices to their basket and report how many HP they had left, which was 3 HP.
- Action 3 – Products page (part one)

  The participant had to navigate to the products page and look up what percentage of unsaturated fat there is in a healthy sandwich, the answer to this question was 22%. Then the participant had to add the sandwich to their basket.
- Action 4 – Ranking

  The participant had to navigate to the ranking page and look up what place they were in the school wide ranking, which was 7th. Then the participant had to remove their score from the list. This was done by clicking the toggle button and the participant had to indicate if their score was actually gone from the list. Finally the

participant had to look up what place their school was in the between schools ranking, which was 2nd.

- Action 5 – Voting

  The participant had to navigate to the voting page and vote for a salmon sandwich. Then the participant had to report what percentage of the school had voted for that sandwich, which was 41%.

- Action 6 – Suggestions

  The participant had to navigate to the suggestions page and fill in a suggestion, this was done by simply clicking on the suggestions box, and send in their suggestion. Then the participant had to look at their previous suggestions and report how many HP they had gotten for previous suggestions, which was 3 HP.

- Action 7 – Products page (part two)

  The participant had to go back to the products page and go to the page with drinks, then they had to add apple juice to their basket.

- Action 8 – Full basket and check out

  For the final action the participant had to go to their now filled basket and remove the apple juice from their basket. They were asked what their new HP total was, at that moment is should have been 5 HP. Then they had to send in their order. In the pop-up that showed after clicking send they had to add carrots to their order as a healthy snack and indicate that they wanted to pay with iDeal and they had to report what their final total was, which was €3.00. Finally, they had to confirm their order.

After the participant had executed all the actions some general feedback on the application and the features was asked. This was done by asking some statements, for example, 'I thought the application was intuitive to use'. The participant could indicate whether they strongly agreed, agreed, were neutral, disagreed or strongly disagreed with the statements. Then they could give their feedback on the six features of the application, these were the food/products, 'Healthy Points', product suggestions, voting, ranking and basket features. The participant could give their feedback per feature on a five point scale, namely very good, good, not good/not bad, bad or very bad. At the very end of the test

there was room for additional feedback. This part of the user test took about fifteen minutes.

Part two: Follow-up interview

When the participant was finished with the test they were invited to the second part of the user test. During this interview the participant and the interviewer walked through all the answers the participant gave during the first part of the user test. When the participant had answered a question wrong they were asked why they had thought that was the right answer. They were also asked to elaborate on the feedback they had given and they were asked if they had ideas for some aspects of the application, for example they were asked if they had suggestions for the icons in the menu bar. The interviews took about fifteen to thirty minutes, depending on how much feedback and suggestions the participant had.

6.2 Results user test and interviews

The results per action or question are shown and discussed along with the information gathered from the interview. Before the participants executed the actions they were asked to identify the icons in the main menu bar to find out if the icons are representative of the page the icons lead to, see table 4. For all the icons, the majority of the participants answered correctly, so this means that the icons represent the different pages well. During the interviews the participants were asked if they had suggestions for different icons and only for the ranking icon it was suggested to use a medal or podium instead of a star, see figure 23.

Table 4. Results of the first question of the user test. The responses are the frequencies of the participants that gave that answer.

Icons	**Responses**
Icon 1, Products Page Icon	10/10 Answered Food Or Products
Icon 2, 'Healthy Points' Page Icon	7/10 Answered Points 2/10 Answered Points/Information About Nutrition 1/10 Answered Achievements
Icon 3, Suggestions Page Icon	7/10 Answered Suggestions Or Ideas

	2/10 Answered Tips 1/10 Answered Information
Icon 4, Ranking Page Icon	8/10 Answered Ranking 1/10 Answered Goals 1/10 Answered Points
Icon 5, Voting Page Icon	7/10 Answered Voting 1/10 Answered Motivation 1/10 Answered Feedback 1/10 Didn't Know

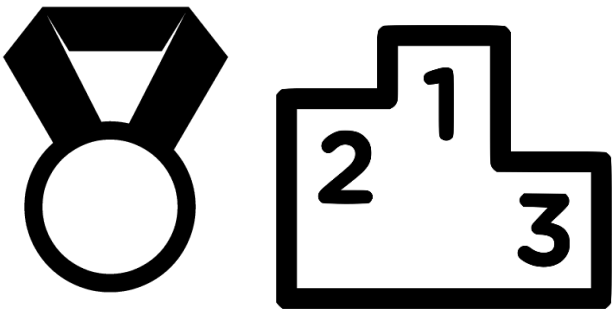


Figure 23. Medal icon (left) or podium icon (right) for the icon of the ranking page.

The results of the questions of the eight actions were summarized in table 5 and the most important results from this table and suggestions from the interviews were elaborated upon. Actions that had no important results either in the first part of the user test or in the interview were not further explained.

Table 5. Results of the eight actions of the user test. The responses are the frequencies of the participants that gave that answer.

Action 1 – Empty basket	
What is inside your basket?	10/10 answered the basket is empty
How easy was it to execute this action?	10/10 answered very easy
Action 2 – Healthy Points	
How much HP do you have?	10/10 answered 13
After spending it on cucumber, how much HP do you have left?	10/10 answered 3
How easy was it to execute this action?	7/10 answered very easy 3/10 answered easy
Action 3 – Products page (part one)	
How much % unsaturated fat is in a healthy sandwich?	8/10 answered 22 2/10 answered 12
How easy was it to execute this action?	7/10 answered very easy 3/10 answered easy
Action 4 – Ranking	
What place in the ranking are you?	10/10 answered 7th

Is your score gone from the list?	10/10 answered yes
What place in the ranking is your school?	10/10 answered 2nd
How easy was it to execute this action?	7/10 answered very easy 2/10 answered easy 1/10 answered not difficult, not easy
Action 5 – Voting	
What percentage of the school chose that sandwich?	9/10 answered 41% 1/10 answered 39%
How easy was it to execute this action?	8/10 answered very easy 2/10 answered easy
Action 6 – Suggestions	
How many HP have you received for previous suggestions?	9/10 answered 3 1/10 answered 10
How easy was it to execute this action?	7/10 answered very easy 3/10 answered easy
Action 7 – Products page (part two)	
How easy was it to execute this action?	8/10 answered very easy 2/10 answered easy
Action 8 – Full basket and checkout	
What is your new HP total?	9/10 answered 5 1/10 answered 13
How much do you have to pay?	9/10 answered €3,00 1/10 answered €0,00
How easy was it to execute this action?	7/10 answered very easy 2/10 answered easy 1/10 answered very difficult

- Action2 – 'Healthy Points'

  During the interview multiple participants said that they could not immediately locate their HP total, and it was suggested to make the font of the HP total bigger.

- Action 3 – Products page (part one)

  Two participants answered 12%, which should have been 22%. During the interviews these participants were asked why they thought that that was the right answer and both participants answered that they had misread the question and gave the percentage of saturated fat. During the interviews the only suggestion that was given was to add a little arrow to indicate that you have to click on the box of the product to add it to your basket.

- Action 4 – Ranking

  During the interviews it was brought up that it should be explained that your total HP score does not change when you spend HP, only when you gain HP. Another aspect that was not clear to all participants was that a student's score is always

taken into the school's total and can thus not be turned off. Only the personal score can be turned off. Some participants also mentioned that it was unclear why the toggle button disappears when they looked at the between schools ranking.

- Action 5 – Voting

  One participant answered 39% which should have been 41%. During the interview that participant said that they answered the percentage before they had voted, making the percentage lower. Another aspect that was suggested during the interviews was that the sandwiches should be placed in order of highest percentage, so the one with the highest percentage at the top of the page and the one with the lowest percentage at the bottom of the page.

- Action 6 – Suggestions

  One participant answered 10 HP which should have been 3 HP. During the interview this participant said that they looked up the HP in the 'Healthy Points' page, instead of on the suggestions page. During the interviews some of the participants mentioned that they would like to see the suggestions other people made so that they would not make a suggestion that has already been made. Another issue that was mentioned is that there should be a limit on the amount of suggestions a student can make per week or month.

- Action 8 – Full basket and checkout

  One participant answered 13 HP for the first question which should have been 5 HP. During the interview this participant said that they looked up their HP total on the 'Healthy Points' page and there the HP total was reset to 13.

  One participant answered €0,00 for the second question which should have been €3,00. During the interview that participant said that the prototype was not working correctly and that the basket was suddenly empty. When asked how easy this action was seven participants answered very easy, two participants answered easy and one participant answered very difficult. The participant that answered very difficult was the participant for whom the prototype was not working correctly. During the interview it was mentioned that it was not completely clear that the HP total underneath the amount they had to pay was their new HP total. Another aspect that came up in the interviews was that when the user has the option to grab a healthy snack that they did not get HP for this. It was also

mentioned that there should be an 'are you sure?' pop-up when removing an item from your basket to confirm.

After the participant had executed all actions they were asked to give their opinion on the application, see table 6. All participants thought that the application was intuitive to use and that the icons were clear.

Eight participants agreed that the nutritional values were depicted in a clear way and two participants answered neutral. During the interviews both participants answered that they think it would be clearer if besides percentages also nutritional values in grams were included in the pie chart.

When the participants were asked if they thought it was good that you have to look at the nutritional values before you can add an item to your cart seven participants agreed, one participant was neutral and two disagreed. During the interviews both participants said that after a while it would be annoying to have to click on a product before you can add it to your basket, especially if you order that product often.

Eight out of then participants agreed that they would use this application if they were still in high school and two participants were neutral. During the interviews both participants said that they rarely used the canteen when they were in high school so using this application would not necessarily change that.

Table 6. Results of the statements for the general opinions of the participants about the application.

	Completely agree	**Agree**	**Neutral**	**Disagree**	**Completely disagree**
I thought the application was intuitive to use.	9	1			
All the icons were clear.	1	9			
I thought that the nutritional values were depicted in a clear way.	4	4	2		
I thought it was good that you have to look at the nutritional values before you can add the product to your basket.	5	2	1	2	
If I were still in high school I would have used this application.	2	6	2		

After the participants gave their general opinion of the application they were asked to evaluate the different features of the application, see table 7. In general most of the participants thought all features were good. A majority of the participants thought all features, except for the 'Healthy Points' feature, were very good. There was one feature where a participant answered bad, namely the basket feature. However, this answer was by the participant whose basket was malfunctioning.

Table 7. Results of the opinions of the participants about the different functions of the application.

	Very good	Good	Not good/not bad	Bad	Very bad
Products	7	2	1		
Healthy Points	5	5			
Suggestions	5	4	1		
Ranking	6	3	1		
Voting	6	3	1		
Basket	7	1	1	1	

Finally the participants were asked if they had any final remarks, additions or suggestions. The answers to this question can be seen in table 8 in both Dutch and English.

Table 8. Responses of the participants about final remarks, additions or suggestions for the application in Dutch and translated into English.

Nr.	Original answer in Dutch	Answer translated into English
1	QR code scannen als je een product direct vanuit de kantine koopt zodat je alsnog de punten krijgt	Scan a QR code so you can still get the HP even if you buy a product straight from the canteen
2	Achievements toevoegen voor meer motivatie	Add achievements so the students are even more motivated
3	Bestelling kunnen doen zonder naar voedingswaarden te kijken	Being able to order a product without having to look at nutritional values
4	Home knop of terug knop	Home button or back button
5	Kleine uitleg bij elke pagina	Small explanation on every page
6-10	Niets toe te voegen	Nothing to add

6.3 Improvements to prototype

In general, the responses to the user test indicated that the application worked the way it was intended to. There was no need to completely change the design and layout, apart from some small details. On the products page a small arrow was added to indicate that the box with the product in it is expandable, see figure 24. As it was mentioned during the interviews that after a while it would be annoying to have to look at the nutritional values a 'quick buy' category was added to the products page. On this page the student can see their last five orders and they can quickly add these to their basket, so they do not have to look at the nutritional values again, see figure 25.

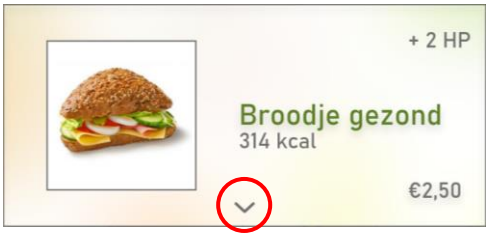


Figure 24. Product box with and added arrow.

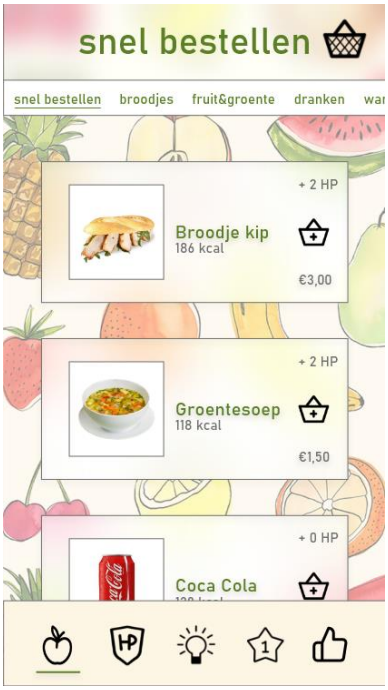


Figure 25. 'Quick buy' option on the products page.

On the ‘Healthy Points’ page the font of the ‘my HP’ total was made bigger as that should be the first thing that the user sees on that page. On the suggestions page a section was added where students can see what suggestions have already been made by other students. This will prevent that students send in the same suggestions, see figure 26. There also needs to be a limit on the amount of suggestions a student can make.

Figure 26. Improved ‘previous suggestions’ section with an option to see your own suggestions (left) and all suggestions (right).

Some of the pages have a small explanation, like the suggestions page, and some pages do not. To make all the pages clearer a pop-up with the explanation of the complete application is added, instead of the explanations on each page. To access this explanation a question mark button is added in the left top corner, see figure 27.

Figure 27. Pop-up explanation of the application.

On the basket page, it might also be useful that students can set the time that they want their order be ready. This way the canteen could prepare orders in advance and the waiting times would be shorter for the students.

Other suggestions that were made during the interviews were adding a QR code to products so that when a student buys a product directly at the canteen they can scan the product and that way they will still receive the HP for that product. Another suggestion was to add achievements to the application, for example an achievement could be ‘buy 5 healthy snacks’ or ‘buy a sandwich and a drink’ and the student gets HP if they complete an achievement. Both these suggestions were very good additions to the application, but before they can be added to the application they need to be tested to see if they work the way they were intended and if there is a need for these additions. The suggestion that was made about adding a home button was a good suggestion, however, in this application there is no home page so this would not work.

Chapter 7

Discussion, Conclusion and Future Research

In this chapter first the results of this study were discussed. In the conclusion the research question of this project was answered and a conclusion was drawn. Finally recommendations for future work were given.

7.1 Discussion

The first point of discussion is that although the application has been designed for adolescents, the user test has been done using ten young adults. This group is representative of the end user as young adults have attended high school within the last couple of years, so they will still remember what it was like and the high school will not have changed a lot in these years. However, in order to find out if the prototype is also well received by the actual end user, a user test using high school students in the school setting has to be done with a bigger population.

Secondly, the canteen also plays a very big part in this project. The canteen also needs an interface to see all the orders that are coming in, the suggestions, end so on. So without this interface the application cannot work. Also a screen above the canteen that displays orders that are ready needs to be designed.

Furthermore, the features that have been included in the prototype were developed based on research, but this does not mean that every student in every high school shares these concerns. At high schools where students feel autonomous about their food choices and where their suggestions are heard, some features of the application might be superfluous.

The ideation of this project was done individually, but as this project was about designing a product for high school students, it might have been useful to include these students in the ideation process. This could have been done through focus groups or co-design with the students.

Additionally, this application works on the premise that high school canteens have enough resources to, using the point saving system, give out free items. However, high school canteens are often non-profit, so some schools might need to either make their prices higher, or adapt the amount of points that the students get and spend.

Lastly, this was only one solution to the problem. To find out if this is the best one other possibilities have to be explored. This could be a solution like an interactive installation in the canteen or a game.

7.2 Conclusion

The research question and sub-questions for this research were:

How can the healthy high school canteen be made more appealing to adolescents using interactive technology?

- *What has already been done at Dutch high schools to encourage teenagers to eat healthier?*
- *What are effective ways to make (food related) technology appealing to adolescents?*

The two sub-questions are answered in *Chapter 2 – State of the Art.* The main initiative that has been done at Dutch high schools to encourage teenagers to eat healthier is the 'Healthy School Canteen Programme' [6]. However, study showed that the healthy school canteen is not very popular among high school students [3]. Since the healthy school canteens have been implemented the students have had some concerns. They are afraid to lose their autonomy and want to give their opinion and share ideas. So in order to make the healthy school canteen more appealing to adolescents these concerns had to be addressed. The interactive technology that was used for this research was a smartphone

application with several features. These features were meant to take away the students' concerns by giving them back their sense of autonomy and give the opportunity to share their suggestions.

Effective ways to make technology appealing to adolescents is by making an interface that has meaningful interactions, does not have too much text and is quick and easy to understand. There have been some technologies that focus on making healthy eating more appealing or more fun for adolescents. Most of these were online food games that teach children about the nutritional values of food, however study showed that these kind of games do not change the behaviour of adolescents long term [23]. However, by offering adolescents an incentive they are more inclined to change their behaviour [13], so that is why a big part of the application was centred around the 'Healthy Points'.

The results of the user test were positive, all features worked as they were intended to and most participants indicted that they would actually like to use the application. Using the feedback and input from the participants some features of the application were adapted to make them better and clearer.

Using the answers to the sub-questions and the result of the prototype evaluation the main research question can be answered: the healthy school canteen can be made more appealing by using an application that offers students an incentive for eating healthy and addresses the students' concerns.

7.3 Recommendation for Future Research

Firstly, the application has to be tested using the end user, which is high school students, and using the results of this user test the prototype might need more adaptations. Secondly, the interface for the canteen has to be developed and tested. This interface is used by canteen staff to set up their own product range and prices in the application and so that the canteen can see the orders that are coming in. The user tests of the application and the canteen interface should also be tested all at once to see if the whole system works smoothly. The development of the canteen interface and the user tests could be on the same scale as this graduation project was.

Lastly, the point system might be more in favour of students that have more to spend in the canteen. Now the only aspect that makes the point system a little fairer is that low cost snacks give more points that an expensive sandwich. Coming up with a point system that is more fair to students with less to spend is important to make the application attractive to everyone.

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Appendices

Appendix A – All screens of the prototype

Appendix B – Information brochure

Informatiebrochure Onderzoek 'Happy Healthy High School'

(Gezond eten op Nederlandse middelbare scholen)

Nieuwegein, datum 4 Mei 2020

Beste lezer,

Bedankt voor uw interesse in deelname aan het 'Happy Healthy High School'-onderzoek. In deze brochure willen we u graag wat meer informatie geven over het onderzoek. In dit onderzoek wordt een smartphone applicatie voor het bestellen van eten en drinken in een schoolkantine getest met het doel om gezond eten populairder te maken onder adolescenten. Het onderzoek zal plaatsvinden aan het einde van juni 2020 via e-mail en Skype.

Procedure

Deelnemers wordt gevraagd een smartphone-applicatie te beoordelen. De deelnemer wordt na het invullen van het bijgevoegde toestemmingsformulier gevraagd om een reeks acties uit te voeren en een vragenlijst in te vullen over hoe die acties zijn verlopen, dit zal 15 minuten duren. Nadat de deelnemer de vragenlijst heeft ingevuld, wordt de deelnemer uitgenodigd voor een Skype-interview met de onderzoeker. In dit Skype-interview kan de deelnemer feedback geven over de applicatie, dit zal 15 tot 30 minuten duren. In totaal duurt dit onderzoek maximaal 45 minuten.

Belangrijk om te weten

Verder is het nog belangrijk om te weten:

- Deelnemers moeten tussen 18 en 25 jaar oud zijn en op een Nederlandse middelbare school hebben gezeten.
- De deelnemer moet over een werkende computer beschikken omdat het prototype, de lijst met acties en de enquête per e-mail naar de deelnemer gestuurd en moet deze op een computer worden geopend.

- Alle gegevens die tijdens dit onderzoek worden verzameld, worden anoniem bewaard en worden niet gedeeld met derden.
- Van het Skype-interview wordt een opname gemaakt. De opname zal worden getranscribeerd en de opname wordt volledig verwijderd.
- Deelname aan dit onderzoek is geheel vrijwillig en de deelnemer kan zich op elk moment tijdens het onderzoek terugtrekken zonder hiervoor een reden te hoeven geven. Dit heeft geen gevolgen voor de deelnemer.
- Als de deelnemer zich tijdens het onderzoek terugtrekt, worden alle gegevens die van de deelnemer zijn verzameld verwijderd, als de deelnemer hierom vraagt.
- Na het onderzoek worden alle gegevens anoniem opgeslagen, dus als de deelnemer zich na het onderzoek wil terugtrekken, zijn de gegevens niet te herleiden tot de deelnemer en kunnen dus niet worden verwijderd.
- Voor vragen kunt u terecht bij de onderzoeker. Onderaan aan de brochure vindt u haar contactgegevens.

Als u mee wilt doen aan dit onderzoek dan kunt u een e-mail of een bericht sturen naar de onderzoeker. U zal dan het toestemmingsformulier toegestuurd krijgen. Wanneer deze is ingevuld ontvangt u het prototype en kunt u beginnen met het onderzoek.

Hoogachtend,

Coördinator: Departement BSS, Zuidhorst

Faculteit EEMCS University of Twente

Tel: +31 (0)53 489 111

Onderzoeker: Anna Maria van der Linden

Tel: +31 (6)20 147 583

E-mail: a.m.vanderlinden@student.utwente.nl

Onderzoek supervisors: Dr. Janet van den Boer (j.h.w.vandenboer@utwente.nl)

Dr. Roelof de Vries (r.a.j.devries@utwente.nl)

Appendix C – Informed consent

Toestemmingsverklaring

‘Hierbij verklaar ik dat:

- Ik op een voor mij duidelijke manier geïnformeerd over de aard en werkwijze van het onderzoek zoals beschreven in de eerder genoemde informatiebrochure ‘Gezond eten op Nederlandse middelbare scholen’. Mijn vragen zijn naar tevredenheid beantwoord.
- Ik weet dat ik het recht heb om deze toestemming in te trekken zonder daarvoor een reden te geven en ik ben me ervan bewust dat ik me op elk moment kan terugtrekken uit het experiment.
- Als mijn onderzoekresultaten worden gebruikt in wetenschappelijke publicaties of op een andere manier openbaar worden gemaakt, worden die volledig anoniem gemaakt.
- Ik me ervan bewust ben dat mijn persoonlijke gegevens niet aan derden zullen worden verstrekt zonder mijn uitdrukkelijke toestemming.
- Ik weet dat als ik nu of in de toekomst meer informatie over het onderzoek wil hebben, ik contact op kan nemen met Anna van der Linden (tel: +31 (6) 20 147 583, e-mail: a.m.vanderlinden@student.utwente.nl)’
- Ik weet dat als ik klachten hebb over dit onderzoek ik deze richten aan de secretaris van de Ethische Commissie van de Faculteit Electrical Engineering, Mathematics and Computer Science op University of Twente, P.O. Box 217, 7500 AE Enschede (NL), e-mail: ethics-comm-ewi@utwente.nl).
- Ik ga uit vrije wil akkoord om deel te nemen aan dit onderzoek.

Ondertekend in tweevoud:

…… ……

Naam deelnemer Handtekening

Voor de onderzoeker:

‘Ik heb uitleg gegeven over het onderzoek. Ik verklaar mezelf bereid eventuele vragen over het onderzoek zo goed mogelijk te beantwoorden.’

…… ……

Naam onderzoeker Handtekening

Appendix D – Complete user test

Happy Healthy User Test

In dit onderzoek word je gevraagd een prototype te beoordelen. Dit prototype is een smartphone applicatie die ontworpen is om gebruikt te worden in en rondom middelbare schoolkantines. Het doel van deze applicatie is om middelbare scholieren te stimuleren om gezondere voedselkeuzes te maken door een beloning tie bieden. Met dit prototype kunnen producten besteld worden, er kunnen punten gespaard worden voor gratis producten, er kunnen suggesties ingestuurd worden voor nieuwe producten, er is een ranglijst voor wie binnen de school de meeste punten heeft gespaard en welke school in totaal de meeste punten heeft gespaard, en er kan gestemd worden op broodjes die dan de volgende week als special in de kantine zullen liggen. Dit onderzoek bestaat uit twee delen. Het eerste deel is deze online vragenlijst waar het prototype beoordeeld wordt, het tweede deel is een Skype-interview waarvoor je wordt uitgenodigd nadat je deze online vragenlijst hebt ingevuld. Het eerste deel duurt ongeveer 15 minuten, het tweede deel duurt 15 tot 30 minuten. Om mee te doen met dit onderzoek vragen we je om akkoord te gaan met de onderstaande verklaring.

Hierbij verklaar ik dat:

- Ik op een voor mij duidelijke manier geïnformeerd ben over de aard en werkwijze van het onderzoek zoals beschreven in de eerder genoemde informatiebrochure 'Gezond eten op Nederlandse middelbare scholen'. Mijn vragen zijn naar tevredenheid beantwoord.
- Ik weet dat ik het recht heb om deze toestemming in te trekken zonder daarvoor een reden te geven en ik ben me ervan bewust dat ik me op elk moment kan terugtrekken uit het onderzoek.
- Ik weet dat als mijn onderzoeksresultaten worden gebruikt in wetenschappelijke publicaties of op een andere manier openbaar worden gemaakt, deze volledig anoniem worden gemaakt.
- Ik me ervan bewust ben dat mijn persoonlijke gegevens niet aan derden zullen worden verstrekt zonder mijn uitdrukkelijke toestemming.
- Ik weet dat als ik nu of in de toekomst meer informatie over het onderzoek wil hebben, ik contact op kan nemen met Anna van der Linden (tel: +31 (6) 20 147 583, e-mail: a.m.vanderlinden@student.utwente.nl)
- Ik weet dat als ik klachten heb over dit onderzoek ik deze kan richten aan de secretaris van de Ethische Commissie van de Faculteit Electrical Engineering, Mathematics and Computer Science op University of Twente, P.O. Box 217, 7500 AE Enschede (NL), e-mail: ethics-comm- ewi@utwente.nl).
- Ik uit vrije wil akkoord ga om deel te nemen aan dit onderzoek.

* Required

1. Email address *

2. Naam: *

3. Ik ga akkoord *

Mark only one oval.

- Ja
- Nee

Voordat je begint

Bedankt dat je meedoet aan dit onderzoek! Hieronder staan 8 acties om uit te voeren met behulp van het prototype. Na elke actie word je gevraagd om te beoordelen hoe goed die actie is verlopen, daarna krijg je de volgende actie te zien. Alle instructies staan in de lijst met acties, volg deze instructies zorgvuldig. Wanneer de hele lijst met acties is doorlopen is er nog ruimte om algemene feedback te geven. Wees alsjeblieft zo eerlijk mogelijk wanneer een actie niet goed verliep en vul in waarom deze actie voor jou moeilijk was, dit zal mij helpen met het verbeteren van de applicatie.

Open nu het prototype door op de volgende link te klikken:
https://xd.adobe.com/view/f4ef8cce-4096-4e99-6329-07fdf2079f2a-82de/?fullscreen&hints=off
Het wachtwoord is: HappyHealthy2020

Je ziet nu het openingsscherm (splash screen), in de uiteindelijke applicatie zal deze vanzelf weggaan zodra de applicatie is opgestart, maar omdat dit een prototype is moet je één keer op het scherm klikken om verder te kunnen. Je ziet nu een van de schermen van de producten van de kantine.

In de menubalk onderaan het scherm zie je vijf icoontjes. Zonder erop te klikken, wat denk je dat elk van deze icoontjes betekend? (nummering van links naar rechts)
Je hoeft hier niet een heel uitgebreid antwoord te geven, gewoon een paar woorden.

4. Icoontje 1 *

5. Icoontje 2 *

6. Icoontje 3 *

7. Icoontje 4 *

8. Icoontje 5 *

Actie 1

Ga naar je mandje.

9. Wat zit er nu in je mandje? *

10. Hoe makkelijk was het om deze actie uit te voeren? *

Mark only one oval.

- Heel makkelijk
- Makkelijk
- Niet makkelijk, niet moeilijk
- Moeilijk
- Heel moeilijk

11. Toelichting:

Actie 2

Kijk hoeveel 'Healthy Points' (HP) je hebt.

12. Hoeveel HP heb je? *

13. Besteed HP aan komkommer schijfjes en deze toe aan je mandje. Hoeveel HP heb je nu nog over? *

14. Hoe makkelijk was het om deze actie uit te voeren? *

Mark only one oval.

- Heel makkelijk
- Makkelijk
- Niet makkelijk, niet moeilijk
- Moeilijk
- Heel moeilijk

15. Toelichting:

Actie 3

Ga naar het scherm met broodjes.

16. Uit hoeveel procent onverzadigd vet bestaat een broodje gezond? *

Voeg een broodje gezond toe aan je mandje.

17. Hoe makkelijk was het om deze actie uit te voeren? *

Mark only one oval.

- ◯ Heel makkelijk
- ◯ Makkelijk
- ◯ Niet makkelijk, niet moeilijk
- ◯ Moeilijk
- ◯ Heel moeilijk

18. Toelichting:

_____

_____

_____

_____

_____

Actie 4

Ga naar het scherm 'ranking'.

19. Op welke plaats in de ranking sta je? *

_____

20. Zet nu het delen van je score uit. Is je score nu weg uit de lijst? *

Mark only one oval.

- ◯ Ja
- ◯ Nee

21. Kijk nu naar de ranking tussen scholen. Op welke plaats staat jouw school? *

_____

22. Hoe makkelijk was het om deze actie uit te voeren? *

Mark only one oval.

- ◯ Heel makkelijk
- ◯ Makkelijk
- ◯ Niet makkelijk, niet moeilijk
- ◯ Moeilijk
- ◯ Heel moeilijk

23. Toelichting:

_____

_____

_____

_____

_____

Actie 5

Ga nu naar het scherm 'stemmen'. Stem op broodje zalm.

24. Hoeveel procent van de school heeft voor dat broodje gekozen? *

_____

25. Hoe makkelijk was het om deze actie uit te voeren? *

Mark only one oval.

- ◯ Heel makkelijk
- ◯ Makkelijk
- ◯ Niet makkelijk, niet moeilijk
- ◯ Moeilijk
- ◯ Heel moeilijk

26. Toelichting:

Actie 6

Ga naar het scherm 'suggesties' en vul een suggestie in (in de uiteindelijke applicatie kan dit door een suggestie te typen, maar omdat dit een prototype is, is het genoeg om op één van de invulvakjes te klikken). Stuur je suggestie in.

27. Hoeveel HP heb je gekregen voor vorige suggesties? *

28. Hoe makkelijk was het om deze actie uit te voeren? *

Mark only one oval.

- Heel makkelijk
- Makkelijk
- Niet makkelijk, niet moeilijk
- Moeilijk
- Heel moeilijk

29. Toelichting:

Actie 7

Ga nu terug naar het producten-scherm. Voeg appelsap toe aan je mandje.

30. Hoe makkelijk was het om deze actie uit te voeren? *

Mark only one oval.

- Heel makkelijk
- Makkelijk
- Niet makkelijk, niet moeilijk
- Moeilijk
- Heel moeilijk

31. Toelichting:

Actie 8

Ga nu naar je mandje (let op! Dit moet vanuit het producten scherm met dranken). Verwijder het appelsap uit je mandje.

32. Wat is je nieuwe HP saldo? *

Verstuur je bestelling.

Je hebt ook nog zin in een gezonde snack. Voeg worteltjes toe aan je bestelling.

33. Hoeveel moet je nu in totaal betalen? *

Geef aan dat je wilt betalen met iDeal. Verstuur je bestelling.

34. Hoe makkelijk was het om deze actie uit te voeren? *

Mark only one oval.

- ◯ Heel makkelijk
- ◯ Makkelijk
- ◯ Niet makkelijk, niet moeilijk
- ◯ Moeilijk
- ◯ Heel moeilijk

35. Toelichting:

Je ziet nu het 'bestelling verzonden' scherm. Je bent nu klaar met alle acties! Als je nog een keer op het scherm klikt kom je weer terug bij het eerste scherm van het prototype, voel je vrij om het prototype nog een keer te bekijken.

Overige vragen

37. Ik vond de applicatie intuïtief om te gebruiken. *

Mark only one oval.

	1	2	3	4	5	
Helemaal mee eens	◯	◯	◯	◯	◯	Helemaal mee oneens

38. Alle icoontjes waren duidelijk. *

Mark only one oval.

	1	2	3	4	5	
Helemaal mee eens	◯	◯	◯	◯	◯	Helemaal mee oneens

39. Ik vond dat de voedingswaarden op een duidelijke manier werden weergegeven. *

Mark only one oval.

	1	2	3	4	5	
Helemaal mee eens	◯	◯	◯	◯	◯	Helemaal mee oneens

40. Ik vond het goed dat je naar de voedingswaarden moet kijken voordat je een product aan je mandje toe kan voegen. *

Mark only one oval.

	1	2	3	4	5	
Helemaal mee eens	◯	◯	◯	◯	◯	Helemaal mee oneens

41. Als ik nog op de middelbare school had gezeten, dan had ik gebruik gemaakt van deze applicatie. *

Mark only one oval.

	1	2	3	4	5	
Helemaal mee eens	◯	◯	◯	◯	◯	Helemaal mee oneens

42. Wat vond je van de functies van de applicatie? *

Mark only one oval per row.

	Heel goed	Goed	Niet goed/niet slecht	Slecht	Heel slecht
Producten/bestellen	◯	◯	◯	◯	◯
HP punten sparen	◯	◯	◯	◯	◯
Suggesties	◯	◯	◯	◯	◯
Ranking	◯	◯	◯	◯	◯
Stemmen	◯	◯	◯	◯	◯
Mandje	◯	◯	◯	◯	◯

43. Is er iets wat er aan deze applicatie toegevoegd zou kunnen worden? *

44. Heb je nog andere opmerkingen/verbeteringen/toevoegingen?

Einde

Heel erg bedankt dat je mee hebt gedaan aan mijn onderzoek, tot snel bij het Skype-interview! Je ontvangt binnenkort een bericht of e-mail om dit interview in te plannen.